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September 12, 1958
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Radiographic Standards for Bronze Castings

Development of High Temperature Resistant Rubber Compounds

Electron Tubes for Critical Environments

Rocket Refractories

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Study of the Deterioration of Adhesives in Metal Bonds at High Temperatures

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U. S. DEPARTMENT OF COMMERCE

OFFICE OF TECHNICAL SERVICES

U. S. Government RESEARCH REPORTS

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250°C ceramic capacitor with wide temperature range. (PB 131893) $3.00 146

Visual acuity as a function of intensity for different hues. (PB 131587) 75 cents 174

APPAREL

Study of synthetic fur ruffs, by R.M. Ellis, Jr. U.S. Air Force. Air Research and Development Command. Wright Air Development Center, Materials Laboratory, Wright-Patterson Air Force Base, Dayton, O. Jul 1954. 53p photos, tables (1 fold). Order from LC. Mi $3.60, ph $9.30. PB 130470

Laboratory and field tests on synthetic wolverine furs were conducted at Wright Air Development Center, Wright-Patterson Air Force Base, Ohio, and in Alaska, respectively. The laboratory tests were conducted on sixty constructions representing variations in methods of fabrication and fiber composition. The furs for field tests represented eight different variations of the most promising types used in the laboratory evaluation. Natural wolf fur was used for comparison in both evaluations. The tests have provided data which should be useful in designing synthetic fur which will be satisfactory in every respect. The importance of comfort is emphasized. AD 502[illegible] AF WADC TR 53-333.

BIBLIOGRAPHY

Aerodynamic studies: Forces acting on an air vehicle. Review of the literature, by M. Z. Krzywoblocki. Chicago. University. Advisory Board on Simulation, Chicago, Ill. Sep 1957. 165p. Order from OTS. $3.00. PB 131892

AD 155532. Project 7060. Includes material reviewed during period Oct-Dec 1956. For Parts 1-4 and 17-18 see PB 131452-131455, 131456, 131519. 1. Aerodynamics - Bibliography 2. Contract AF 33(616)-2797 3. AF WADC TN 56-360, Part 20

Bibliographical forms for literature citations, by James G. Hodgson. U.S. Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill. Nov 1957. 62p diagrs. Order from LC. Mi $3.90, ph $10.80. PB 132620

1. Bibliographies - Forms

Bibliography of reports and technical publications, 1953-1956. Texas. University. Electrical Engineering Research Laboratory, Austin, Tex. Dec 1956. 23p. Order from LC. Mi $2.70, ph $4.80. PB 132068

For earlier bibliography see PB 120412 and 120412s. 1. Radio waves - Bibliography 2. Engineering, Electrical - Research - Bibliography 3. Contract Nonr-375(01) 4. TU EERL 89

CHEMICALS AND ALLIED PRODUCTS

Drugs and Pharmaceuticals

Effects of acetylcholine (ACh) and choline on neuromuscular transmission in normal subjects (U), by David Grob and Richard J. Johns. U.S. Chemical Corps. Chemical Warfare Laboratories, Army Chemical Center, Md. Mar 1956. 9p. Order from LC. Mi $1.80, ph $1.80. PB 127414

The report describes the probable function of ACh in nerve impulse transmission, and its effects if present in excessive amounts at motor end plates. Also described are the vascular, stimulating "prompt" depressant, and "late" depressant effects of ACh, the dose-effect relationship, and how neuromuscular transmission is effected if ACh is used either before or after other drugs. Similar information is given for choline itself. Project no. 4-59-12-007. Contract DA 18-108-CML-5611. CC CWL R 2002.

Effects of anticholinesterase agents on respiratory deadspace, resistance, and compliance during artificial ventilation, by John A. Clements, James O. Elam and Rudolph P. Johnson. U.S. Chemical Corps. Chemical Warfare Laboratories, Army Chemical Center, Md. Apr 1956. 26p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 127409

Well-marked increases of respiratory resistance and decreases of respiratory compliance were produced and resolved by these drugs. Simultaneous estimation of (single breath) deadspace by rapid carbon dioxide and tidal volume recording showed this quantity to fall and rise in step with the mechanical changes. The mathematical forms of interrelationship between the variables resistance, compliance, and deadspace have been deduced from theoretical considerations. The experimental results conformed reasonably well. Certain other respiratory and circulatory parameters which might perturb the predicted co-variation of these quantities have been discussed. Project no. 4-08-02-018. CC CWL R 2018.

Effects of drugs on thermodynamics of enzyme action, by Chalmers L. Gemmill. Virginia. University. School of Medicine. Dept. of Pharmacology, Charlottesville, Va. n.d. 3p. Order from LC. Mi $1.80, ph $1.80. PB 126918

Date is 1955 or later. 1. Drugs - Effect on enzymes 2. Enzymes - Effects of drugs 5. Contract Nonr-111400, NR 123-705, Final report

Evaluation of drugs effective against motion sickness, by Herman I. Chinn. U.S. Air Force. School of Aviation Medicine, Randolph Air Force Base, Tex. Oct 1955. 13p tables (1 fold). Order from OTS. 50 cents. PB 131895

Joint Army - Navy - Air Force study. 1. Drugs - Effectiveness 2. Motion sickness - Remedies 3. AF SAM R 55-144

Organic Chemicals

Addition of halogenated carbonyl compounds to olefins and fluoroolefins, by Paul Tarrant and Charles Tomasino. Florida. University, Gainesville, Fla. Jul 1956. 27p tables. Order from LC. Mi $2.70, ph $4.80. PB 127469

In the course of this research, a study was made of the addition of various halogenated carbonyl compounds to olefins. Eleven new compounds were prepared and characterized. These are $CH_3C(CF_3)ClCH_2CCl_2COCl$, $CH_3C(CF_3)BrCH_2CClBrCOCl$, $CF_2BrCH_2CBrClCOCl$, $CF_2BrCH_2CBrClCOOCH_3$, $CF_2BrCH_2CCl_2COCl$, $CHFBrCH_2CCl_2COOC_2H5$, $CH_3CFBrCH_2CCl_2COCl$, $CH_3(CH_2)_3CHBrCH_2CBr_2COCF_3$, $CH_3(CH_2)_3CHBrCH_2CH_2COCF_3$, $CH_2CHBrCH_3CBr_2COCF_3$, and $CH_2ClCHBrCH_2CCl_2CHO$. Contract Nonr-1017(00), NR 356-320.

Effect of nitric acid scavengers on the solvolysis of nitroguanidine in sulfuric acid, by Robert Evans and Sol Skolnik. U.S. Naval Powder Factory. Research and Development Dept., Indian Head, Md. Apr 1956. 22p graph, table. Order from LC. Mi $2.70, ph $4.80. PB 127421

The solvolysis of nitroguanidine in sulfuric acid has been studied with special reference to the amount of guanidine which could be recovered. These studies were made at three concentrations of sulfuric acid with certain nitric acid scavengers, with excess nitric acid, and with sulfuric acid alone. Removal of nitric acid by chemical or physical means increased the yield of guanidine and indicated that the mechanism of solvolysis postulated by Holstead and Lamberton is essentially correct. NAVORD 5154. NPF TR 86.

Heat transfer to supercritical fluorinated hydrocarbons. Massachusetts Institute of Technology. Division of Sponsored Research, Cambridge, Mass. Contract Nonr-1841-14. Order separate parts described below from LC, giving PB number of each part ordered.

Progress report no. 1, covering period 1 Mar 1956 - 30 Jun 1956, by R.J. Ferran, Z.J.J. Stekly, M. Mojdara, J.P. Barger. Jul 1956. 40p diagrs, graphs. Mi $3.00, ph $6.30. PB 128013

1. Heat - Transference - Measuring equipment 2. Hydrocarbons, Fluorinated - Analysis 3. Freon 12 - Thermodynamic properties

Progress report no. 2, covering period 1 Jul - 1 Oct 1956, by Z.J.J. Stekley, R.J. Ferran, and J.P. Barger. Oct 1956. 11p diagrs, table. Mi $2.40, ph $3.30. PB 129982

1. Heat - Transference - Coefficients
2. Hydrocarbons, Fluorinated - Analysis

Progress report no. 3, covering period 1 Oct to 31 Dec 1956, by J.P. Barger and R.J. Ferran. Jan 1957. 7p. Mi $1.80, ph $1.80. PB 132464

1. Heat - Transference - Coefficients
2. Hydrocarbons, Fluorinated - Analysis

Kinetics of peroxide: Catalyzed addition reactions of halogenated compounds to olefins, by W.S. Brey and R.C. Paule. Florida. University, Gainesville, Fla. Jul 1956. 41p drawing, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 127470

The addition of a wide variety of halogenated compounds to olefins has been accomplished in recent years through the use of peroxide. Report describes the study of the kinetics of such reactions. The addition of bromotrichloromethane to n-octene-1 in the presence of benzoyl peroxide is a typical example of such a reaction and the kinetics of this reaction has occupied a major portion of this study. Contract Nonr-1017(00), NR 356-320.

Measurement of very slow reaction rates; decarboxylation of alanine, by Dwight Conway and W.F. Libby. Chicago. University. Enrico Fermi Institute for Nuclear Studies, Chicago, Ill. Feb 1957. 29p tables. Order from LC. Mi $2.70, ph $4.80. PB 126962

The method of measuring slow reactions using radioactive labelling and low level counting techniques has been shown to apply to the decarboxylation of alanine at temperatures corresponding to half-lives from 0.1 to 10^4 years, the results being essentially in agreement with Dr. Abelson's at higher temperatures. AD 115100. AF OSR Chem 30-20. Contract AF 18(600)-1863. AF OSR TN 57-60.

Occlusion of alkylsilanes by urea, by Jack Radell, Paul D. Hunt, and William D. Burrows. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Aeronautical Research Laboratory, Wright-Patterson Air Force Base, Dayton, O. Jan 1958. 21p diagrs, tables. Order from OTS. 75 cents. PB 131670

Urea occlusion compounds have in recent years been extensively investigated and prepared from a variety of linear molecules bearing various functional groups. The research reported herein deals with the application of urea occlusion to alkylsilanes. The data indicate that length and cross-sectional diameter of the molecule are the limiting factors in urea occlusion. Scale models may be used to predict which alkylsilanes will form urea occlusion compounds. The technique of urea occlusion offers a convenient way of storing many compounds incorporating the highly reactive Si-H bond, and permits the separation and purification of many alkylsilanes. AD 142303. Project 3044, Task 70343. AF WADC TR 58-14.

Preparation of fluorine containing compounds, by H.C. Brown, R.D. Dresdner, J.A. Wethington, Jr., and J.A. Young. Florida. University, Gainesville, Fla. Contract Nonr-580(03), NR 356-333. Order separate parts described below from LC, giving PB number of each part ordered.

Quarterly technical report for the period 1 Nov 1955-31 Jan 1956. Feb 1956. 18p tables. Mi $2.40, ph $3.30. PB 127139

Summarizes work on electrochemical synthesis in hydrogen fluoride and various other fluorinated compounds, a large-scale run on

$(CH_3)_2$ NCOCl, identification and reactions of compounds. For summary report, Jan 1954-May 1956 see PB 121818.

Quarterly technical report for the period 1 May 1956-31 Jul 1956. Aug 1956. 47p diagrs, graphs, tables. Mi $3.30, ph $7.80. PB 127405

Summarizes work for the period on electrochemical syntheses in hydrogen fluoride, reactions of various fluorocarbons, a study of reactions using alkali metal vapors and of the reaction of pyrolysis products of polytetrafluoroethylene with sulfur.

Pressure-volume-temperature properties of fluorobenzene, by D. R. Douslin, R. T. Moore, J. P. Dawson, and Guy Waddington. U.S. Bureau of Mines. Branch of Thermodynamics, Bartlesville, Okla. Aug 1957. 36p drawings, graphs, tables. Order from OTS. $1.00. PB 131497

Studies of the pressure-volume-temperature (P-V-T) properties of fluorobenzene have led to basic data for gas compressibility, critical constants, vapor pressure and orthobaric liquid and vapor density; these data have been correlated by means of the Beattie-Bridgeman equation of state, the Cox vapor pressure equation and Stockmayer's intermolecular potential energy function for polar gases. A detailed description of the experimental method is given. AD 136498. Contribution 67. Contract CSO 680-57-4. AF OSR TN 57-512.

Research in the reactions of organic compounds. I. Pyrolysis of epimeric 1-menthyl p-bromobenzene-sulfinates, by William C. Firth, Jr., Roman T. Markiw, and Harry F. Herbrandson. II. Decomposition of optically active 2-octanesulfonyl chloride, by William S. Kelly, John Versnel, and Harry F. Herbrandson. Rensselaer Polytechnic Institute. Research Division, Troy, N.Y. Jun 1956. 19p diagrs, tables. Order from LC. Mi $2.40, ph $3.30. PB 126957

Covers period 1 Jun 1955-31 May 1956. 1. Sulfonyl chlorides - Decomposition 2. Menthene - Decomposition 3. Sulfur compounds - Organic - Reactions 4. Contract Nonr-1787(00)

Vinyl derivatives of some metals, by Dietmar Seyferth. Harvard University. Dept. of Chemistry, Cambridge, Mass. Feb 1957. 47p tables (part fold). Order from LC. Mi $3.30, ph $7.80. PB 132543

Study of synthesis of vinyl-tin compounds, cleavage of vinyl-tin compounds by halogens and by protonic acids, vinyl-mercuric halides, preparation of vinylgermanium compounds by the Grignard reaction, and some reactions of vinyl-tin compounds. Constitutes annual report for period 1 Mar 1956 to 1 Jan 1957 under Contract Nonr-1866(13).

Agricultural Chemicals

Insecticide and rodenticide program of the Dept. of the Army. Annual report, Jun 1955, by John J. Pratt, Jr. U.S. Quartermaster Research and Development Center. Chemical and Plastics Division, Natick, Mass. Jun 1955. 29p photos, tables. Order from LC. Mi $2.70, ph $4.80. PB 132470

The report consists of a summary, background, present technical status, unsatisfied requirement, future plans and conclusions of the year's work.

Plastics and Plasticizers

Allyl polymerization - review of the literature, by Roy C. Laible. U.S. Army. Quartermaster Research and Engineering Command. Textile, Clothing and Footwear Division. Quartermaster Research and Engineering Center, Natick, Mass. Oct 1957. 74p tables. Order from LC. Mi $4.50, ph $12.30. PB 132923

The field of allyl polymerization has been reviewed and the advantages and disadvantages of such polymerizations pointed out. The future of allyl polymers and their use as flame retardant materials are reviewed in the light of current trends. Project 7-12-01-002. QMC TSR 99.

Contact angles between water and some polymeric materials, by H. H. G. Jellinek. U.S. Army. Corps of Engineers. Snow, Ice and Permafrost Research Establishment, Wilmette, Ill. Aug 1957. 12p photo, diagr, table. Order from LC. Mi $2.40, ph $3.30. PB 132566

Measurements were made with 22 more or less hydrophobic polymers and lacquers at intervals of 5 or 10 min for periods up to 1 hr. All surfaces were carefully cleaned, and some surfaces were baked. Highest initial (time 0) average contact angles (106^{o} - 106.6^{o}) were measured of Foster Snell rain repellant wax, Barrett 25-218 water repellant varnish (air-dried), and Cardolite NRL-7241. The measurement apparatus is illustrated, and data are tabulated. D.A. project 8-66-02-004. SIPRE project 22.1-31. SIPRE RR-36.

Plastic containers for dextran, by Timothy B. Barila. U.S. Army. Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D.C. Sep 1956. 6p. Order from LC. Mi $1.80, ph $1.80. PB 132900

One hundred units of dextran packed in plastic bags, enclosed in waterproofed barrier envelopes, with detachable recipient sets were evaluated. There were no clinical complications encountered. Those of a logistic nature are minor and easily remedied by proper instruction of utilizing personnel and by

manufacturer's modification. Project 6-59-029, Subtask No. 1. WRAIR 153-56.

Study of the deterioration of adhesives in metal bonds at high temperatures, by J. M. Black and R. F. Blomquist. U.S. Forest Products Laboratory, Madison, Wis. Mar 1956. 47p photo, graphs, tables. Order from OTS. $1.25. PB 131500

The thermal resistance of clad aluminum bonded with FPL-878, a phenol-epoxy resin adhesive, was decreased markedly by progressively longer precure temperatures. Thermal resistances of FPL-878 in bonds of stainless steel was improved by coating chemically treated stainless steel with zinc naphthenate and heating to 1200°F. Project 7340, Task 70338. Contract DO 33(616)-54-11, Amend. 1 (55-1499). AF WADC TR 55-330.

Synthesis and reactions of fluorinated epoxides. Annual summary of experiments covering the period 1 Jan 1956-1 Jan 1957, under Contract Nonr-1859(01), NR 356-370, by David M. Howell, Robert A. Shepard, and Stephen S. Winter. Northeastern University, Boston, Mass. Feb 1957. 22p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 132465

1. Epoxides, Fluorinated - Reactions
2. Epoxides, Fluorinated - Synthesis

Paints, Varnishes and Lacquers

Engineering study of vacuum metallizing, by Frank C. Perkins. Denver. University. Denver Research Institute, Denver, Colo. Dec 1956. 35p diagrs, tables. Order from OTS. $1.00. PB 131542

Thick deposits (0.001 inch) of cadmium, zinc, lead, silver and copper can be readily obtained using a tantalum-boat type of heating source. Aluminum, chromium, titanium and nickel can be deposited in thin coatings (0.0001 inch) by use of tungsten wire filaments. Attempts to increase deposit thickness by reducing the filament-to-specimen distance may have an adverse effect on adherence and quality of the coating. The best adhesion of deposits to base metals was obtained when the base metal was prepared by file abrasion, followed by glow discharge bombardment under inert atmosphere. A majority of the coatings tested under the conditions of the ferrosyl test were found to be porous. Covers period from 1 Nov 1955-31 Nov 1956 under Contract DA 23-072-ord-591.

Heat and abrasion resistant paints for rocket launchers, by T. Rice. U.S. Arsenal, Rock Island, Ill. Aug 1957. 22p photos, tables. Order from OTS. 75 cents. PB 131543

Comparative tests of abrasion and heat resistance of 13 coatings have been made on steel and aluminum panels. Coatings included were ceramic, silicone, dibutyl titanate, epoxy and Teflon. No olive drab dibutyl titanate coating was available, but zinc dibutyl titanate withstood tests very well. Project TU 2-3004. DA project 517-05-004. For earlier reports see PB 121736 and 131268. RIAL R 57-2107.

Performance of waterproofing compounds applied to electrical resistance strain gages subjected to hydrostatic pressure, by Peter M. Palermo. U.S. David Taylor Model Basin, Washington, D.C. Dec 1954. 19p photos, diagrs, graph, tables. Order from LC. Mi $2.40, ph $3.30. PB 126995

Experiments have been performed to find a method of waterproofing strain gages subjected to hydrostatic pressure which is quick, economical, and reliable and which requires a minimum amount of special skill on the part of the workman. Three of the more promising methods are described in detail. DWTMB-760.

Preparation, properties, and optical application of thin films of cerium dioxide, by George Hass and John B. Ramsey. U.S. Army. Corps of Engineers. Engineer Research and Development Board, Fort Belvoir, Va. Oct 1956. 46p graphs. Order from OTS. 50 cents. PB 131546

This report presents data on the optical properties of evaporated cerium dioxide (CeO_2) films and demonstrates their usefulness in multilayer combinations. Cerium dioxide evaporated from heavy tungsten boats forms extremely hard, nonabsorbing, high-index films. The refractive index of the films produced by direct evaporation of CeO_2 depends strongly on the temperature of the substrate and the evaporation conditions. Project 8-23-02-311. Covers work from Nov 1952-Mar 1955. ERDL R 1466-RR.

Temperature-resistance studies of evaporated bismuth films, by James M. Galligan. Illinois. Engineering Experiment Station. Electrical Engineering Research Laboratory, Urbana, Ill. Jan 1957. 50p photos, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 126985

It was found that the temperature coefficient of resistance, α was negative for those films which had a resistance in the range from 12 to approximately 400 ohms. Above 400 ohms α was positive. Thermal activation energies ranged from +0.27 to -0.09 electron volt. Aging in air for one month had the effect of increasing all values of activation energy by about 0.07 electron volt. AD 115076. OSR project no. R 355-10-3. Thesis - University of Illinois, 1957. Technical note no. 1. Contract AF 33(038)-21255. AF OSR TN 57-38.

Thin metal films as corrosion indicators, by Richard B. Belser and Frank E. Hankinson. Georgia Institute of Technology. Engineering Experiment Station, Atlanta, Ga. May 1958. 97p photos, drawings, graphs, tables. Order from OTS. $2.25. PB 131894

In order to investigate the feasibility of using thin metal films deposited on glass or plastic substances as integrating indicators of corrosive conditions, the corrosion rates of films of nine metals exposed to air atmospheres of controlled temperature and humidity have been studied. Of the metals iron, manganese, copper, nickel, cobalt, strontium, calcium, magnesium and zinc, only films of iron and manganese proved worthy of more than a preliminary survey. A more intensive study of the corrosion properties and rates of iron and manganese films and of the bimetal pairs iron and copper and iron and gold was undertaken. This investigation disclosed the important role in metal film corrosion of the adsorbed gas layer normally present on glass substrates. AD 155516. Project 7312, Task 73122. Covers work from 15 Nov 1956 to 15 Nov 1957 under Contract AF 33(616)-3879. Based on WADC TR 56-237 (PB 121536). AF WADC TR 57-662.

Inorganic Chemicals

Carbon formation from acetylene in the shock tube, by Eugene N. Bennett. California Institute of Technology. Daniel and Florence Guggenheim Jet Propulsion Center, Pasadena, Calif. Jun 1956. 96p diagrs, graphs. Order from LC. Mi $5.40, ph $15.30. PB 127156

The use of the shock tube for the study of carbon formation from acetylene has been considered theoretically and studied experimentally. In the calculations, the state of the gas is determined behind incident and reflected shocks for a wide range of shock strengths and for various excitation models of the internal degrees of freedom. A simple mechanism has been assumed for the thermal decomposition, namely, the formation of solid carbon and hydrogen. Estimates are presented for the minimum times spent by the gas in a uniform state at the elevated temperatures behind reflected shocks. The shock strengths required to initiate decomposition of acetylene at various pressures have been investigated experimentally. Thesis - California Institute of Technology. Contract Nonr-220(03), NR 015-401, Technical report no. 20. Contract AF 18(603)-2, Technical report no. 2.

Catalytic decomposition of hydrogen peroxide in a constant volume reactor, by C.C. Neas, M.W. Raymond, and C.O. Ewing. Massachusetts Institute of Technology. Division of Industrial Cooperation, Cambridge, Mass. Nov 1946. 50p photos, diagrs, graphs, table. Order from LC. Mi $3.30, ph $7.80. PB 130940

The bomb reactor which was developed is readily capable of determining effects such as the relative activity of catalysts, the effect of peroxide and catalyst concentrations, and the poisoning effect of peroxide stabilizers at conditions of temperature, pressure and concentration which are close to those of practical interest. AD 138642. DIC 6351. Summary of thesis. Drawings available from MIT. Contract NOrd-9107, Task C. MIT DIC R 11.

Comparison of the catalytic activity of noble and non-noble gas type ions on the decomposition of H_2O_2, by Dorothy P. Enright, Evelyn C. Marboe, and W.A. Weyl. Pennsylvania State College. School of Mineral Industries, State College, Pa. Jan 1949. 5p. Order from LC. Mi $1.80, ph $1.80. PB 132466

To supplement the study of the influence of the carrier on the catalytic activity of adsorbed heavy metal ions, the effect of other ions has been studied in order to bring out the difference between noble gas type ions and non-noble gas type ions (heavy metal ions) when adsorbed at the surface of a glass powder The divalent ions of the alkaline earth group and pb^{++} have a weak positive effect upon the rate of decomposition of H_2O_2. It was found that platinum gauze acted as a strong positive catalyst in this reaction. When adsorbed at the surface of a glass powder, the divalent ions of the noble gas type showed a slight increase in the H_2O_2 decomposition; approximately 5 times that of the alkaline earth group ions. All ions were found to poison the catalytic effect of platinum. ATI 47863. Contract N6 onr-269, T.O. 8, NR 032-265. PSC SMI TR 2.

Electrical properties of thorium oxide and similar materials at high temperature. Final report covering period 1 Nov 1953-31 Jan 1957, under Contract DA 36-034-ord-1487RD, by W.E. Danforth. Franklin Institute. Bartol Research Foundation, Swathmore, Pa. Feb 1957. 13p. Order from LC. Mi $2.40, ph $3.30. PB 130439

The foremost problem was that gradual deterioration of a thoria cathode emitter (and other emitters employing polar compounds) which is caused by the passage of high current densities for long periods. Investigations were carried out on polarization phenomena in thorium oxide and associated theoretical considerations, Hall effect in thorium metal, thermoelectric power of thorium vs. platinum. Optical absorption spectra in single crystals of ThO_2 have been extensively studied and preliminary investigations have been made of polarization effects in sodium chloride and in silver chloride. Project TB 2-001(718). Contract DA 36-034-ord-1487RD, Final report.

Influence of exposure to various carbon dioxide concentrations on flicker fusion frequency and alpha blocking, by K.E. Schaefer and Charles R. Carey. U.S. Naval Medical Research Laboratory. Naval Submarine Base, New London, Conn. Aug 1954. 16p diagr, graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 130705

Twenty-four subjects were exposed to 1.5 per cent, 3.3 per cent, 5.4 per cent and 7.5 per cent CO_2 in air over periods of 15 minutes, with pre- and post-exposure periods on air of equal length. Flicker fusion frequency was measured with a Krasno-Ivy flicker photometer between the 10th and 15th minutes of the experimental periods (CO_2 and air). In a second series of experiments, with 22 subjects, the latent time of alpha blocking was determined, using a light stimulus of 10 seconds' duration and 300 millilamberts' brightness. Alveolar CO_2 concentration was continuously recorded with an infrared CO_2 meter, and the respiratory minute volume measured. NMRI Proj. NM 002 015.11.04. NAV MRL 251.

Investigation of the oxidation of silicon carbide, by Thomas H. Elmer. Fairchild Engine and Airplane Corporation. NEPA Division, Oak Ridge, Tenn. Mar 1951. 17p col. photo, graphs. Order from LC. Mi $2.40, ph $3.30. PB 130431

Preliminary oxidation tests of approximately 100 hours duration were carried out on granular silicon carbide and on selected coarse crystals of silicon carbide at temperatures ranging from 700° to 1550°C (1290° to 2820°F). The oxidation results for fresh silicon carbide exposed for 72 hours in air show that oxidation increases rapidly with temperature. In the absence of fluxes, the coating of SiO_2 formed at temperatures above 1400°C (2550°F) may spall off during cooling to room temperature, because of differences in linear expansion between the coating and silicon carbide. Color will not reproduce. NEPA 1768.

Kinetics of the thermal decomposition of diborane, with a review of structure data, by Richard P. Clarke. Princeton University. Dept. of Chemistry, Princeton, N.J. Jul 1950. 44p diagrs, graphs, tables. Order from OTS. $1.25. PB 131879

Technical memorandum 16. Technical paper 49. Under joint sponsorship of Project Bumblebee and Project Squid. 1. Borohydrides - Decomposition 2. Borohydrides - Reactions 3. Contract N6ori-105, T.O. 3, Phase 2, NR 220-038.

Metal and self-bonded silicon carbide, by R.A. Alliegro, L.B. Coffin, and J.R. Tinklepaugh. New York State College of Ceramics, Alfred, N.Y. Jan 1954. 66p photos, diagrs, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 130472

Dense silicon carbide in the range of 95-97% of theoretical density was produced using various grain size mixes of alpha silicon carbide and beta silicon carbide. Hot pressed silicon carbide bonded by Cr:Mo (1:1) has a strength of 31,000 psi, modulus of rupture. This material is relatively stable at high temperatures in air, carbon monoxide and steam. Silicon carbide structures having porosities in the 35 to 40% range may be infiltrated by Hastelloy C under pressure. Chromium-nickel alloys and titanium metal will bond silicon carbide when sintered in vacuum. AD 50078. Task 70634. Covers work from 11 Jan 1953-10 Jan 1954 under Contract AF 33(038)-16190. For earlier report see PB111415; Part 3 of this report is PB 121353. AF WADC TR 54-38.

Molten salts: Electrical conductance, transport, and cryoscopic behaviour, by Henry J. Gardner and George Janz. Rensselaer Polytechnic Institute. Research Division, Troy, N.Y. May 1956. 86p diagrs, graphs, tables. Order from LC. Mi $4.80, ph $13.80. PB 127141

The process of fusion, and the measurement of electrical conductance, transport, and freezing point lowering are reviewed for molten salts, with attention directed to the more recent investigations. Examination of these data shows that, in the light of the rapidly growing results from thermodynamic and cryoscopic studies, the ionic nature of the melts provides a basis for interpretation of conductance processes, especially when the separate contributions of anions and cations are considered. Ideal behavior does not often extend to conductance in mixtures. In a general way, deviations may be ascribed to complex formation, and sometimes simply to disparity in ionic sizes. Contract Nonr-591 (06), Technical report no. 2.

Research on aluminum antimonide for semiconductor devices, by Andrew Herczog, Rolf R. Haberecht and Arthur E. Middleton. Mallory, P.R. & Co., Inc., Indianapolis, Ind. Mar 1958. 33p photo, diagrs, graphs, tables. Order from OTS. $1.00. PB 131849

The objectives of this project are the development of purification and crystal growing techniques for obtaining the aluminum antimonide material best suited for device applications. Further objectives include the study of chemical, physical, and electrical characteristics of these crystals, the development of techniques for making ohmic contacts and P-N junctions, and the study of the feasibility of devices such as rectifiers and transistors for 500°C operating temperature. AD 151144. Project 4156, Task 41652 (formerly Task 41762). Covers work from 15 Mar 1956-10 Sep 1957 under Contract AF 33(616)-3481. AF WADC TR 57-631.

Research on methods of treating cadmium sulfide elements, by Allan Carlson, Warren Deshotels, Jacob M. Jost, and Lebo R. Shiozawa. Clevite Corporation. Clevite Research Center, Cleveland, O. Nov 1957. 52p photos, diagrs, graphs, tables. Order from OTS. $1.50. PB 131847

This study forms part of a program for the development of a cadmium sulfide single crystal solar battery. Emphasis was placed on a fundamental study of photovoltaic electrodes formed on cadmium sul

fide crystals by copper compounds. It was found that the behavior of such junctions as circuit elements was in agreement with published theory. The cells had photoelectric energy conversion efficiencies in sunlight ranking between that of selenium and silicon solar batteries. A number of other ohmic and non-ohmic electrodes on cadmium sulfide cyrstals were also prepared and studied. Experiments on impurity doping of crystals by solid-state diffusion resulted in measured diffusion constants for indium and aluminum. AD 151024. Project 6-(2-1115), Task 70843. Covers work from 15 Feb 1956-31 Oct 1957 under Contract AF 33(616)-3451. AF WADC TR 57-749.

Rhenium heptaselenide as a hydrogenation catalyst, by Charles W. Whittle. Brigham Young University. Dept. of Chemistry, Provo, Utah. May 1956. 106p diagr, tables. Order from LC. Mi $5.70, ph $16.80. PB 127135

Three preparations of rhenium--rhenium heptaselenide, 5% rhenium on alumina, and rhenium triethoxide--were investigated for catalytic activity in the hydrogenation of organic substrates. AD 88363. OSR Chem R 351-30-33. Thesis - Brigham Young University. Contract AF 18(600)-1164. AF OSR TN 56-243.

Stoichiometry, resistivity and thermoelectric power of cerium dioxide below 500°C, by A.W. Czanderna and J.M. Honig. Purdue University. Dept. of Chemistry, Lafayette, Ind. Sep 1957. 34p drawing, diagr, graphs, table. Order from LC. Mi $3.00, ph $6.30. PB 132133

AD 136591. 1. Cerium dioxide - Thermoelectric properties 2. Contract AF 18(603)-45 3. AF OSR TN 57-602

Summary of investigations. Final technical report under Contract N7 onr-35809, by Charles A. Kraus. Brown University. Metcalf Research Laboratory, Providence, R.I. Jul 1956. 8p tables. Order from LC. Mi $1.80, ph $1.80. PB 127449

Summarizes seven technical papers published in various journals, giving the results of work under this contract.

Thermodynamic properties of neutral OH from near zero to 6000°K, by H. L. Johnston, Jack Belzer, and Lydia Savedoff. Ohio State University, Dept. of Chemistry. Cryogenic Laboratory, Columbus, O. n.d. 15p tables. Order from LC. Mi $2.40, ph $3.30. PB 130413

The spectroscopic analysis of neutral OH has been reexamined, and the constants of the final states of the (4, 1), (4, 2), (4, 3), and (4, 4) bands and the band origins were estimated from the data of Tanaka and Koana. The rotational constants for the ground state and the vibrational constants for the upper and lower states were reevaluated to include these newer data. The thermodynamic properties of the OH molecule were computed from 1° to 6000°K and were found to agree with those previously reported by Johnston and Dawson, when account is taken of the newer values employed by the basic physical constants. ATI 139967. For report 6 see PB 126959. Contract N6 onr-225, T.O. 12, NR 058-005, Technical report no. 5. OSURF Proj 316, Technical report no. 5.

Thermodynamic tables of properties of H_2O at equilibrium, by Alan Q. Eschenroeder. U.S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen Proving Ground, Md. Oct 1956. 18p tables. Order from LC. Mi $2.40, ph $3.30. PB 127276

A tabulation of composition and thermal properties of H_2O and its dissociation products at equilibrium is presented. The range of states extended from 100 psia at 2000°K to 50,000 psia at 12,000°K. APG BRL TN 1092.

Analytical Chemistry

Determination of moisture in ferritic electrode coverings as specified in military specification MIL-E986a, by Samuel Miller. U.S. Arsenal, Detroit. Laboratories Division. Materials Laboratory, Center Line, Mich. Feb 1957. 17p photos, graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 132797

1. Moisture - Determination 2. Electrodes - Coatings 3. Electrodes, Ferritic 4. DA R 3796

General method for determination of phthalate esters in propellants, by Harry Stalcup, Frank McCollum, and C. L. Whitman. U.S. Naval Powder Factory. Research and Development Dept., Indian Head, Md. Dec 1956. 20p tables. Order from LC. Mi $2.40, ph $3.30. PB 132450

Supersedes technical report 39, 4 Sep 1951.
1. Phthalic acid - Esters - Determination
2. Propellants - Analysis 3. NAVORD 5354
4. NPF TR 93

Infrared analysis of wetting agents, by Jules B. Counts. U.S. Aberdeen Proving Ground. Coating and Chemical Laboratory, Aberdeen, Md. Jan 1958. 15p diagr, table. Order from LC. Mi $2.40, ph $3.30. PB 132419

The Laboratory has compiled an infrared catalog of important surface active agents, with particular emphasis being placed on wetting agents used in proprietary iron phosphate coatings. In order to minimize the number of comparisons which must be made between an unknown and the known spectra of the cata-

log, a scheme of analysis is presented herein based upon the prominent features of the spectrum and a system of group classification . Also included in this report are suggestions for obtaining the spectrum of an unknown wetting agent. Ordnance project TB 4-006D. D. A. project 593-32-006. APG CCL R 35.

Oxygen analysis by microwave absorption measurements. Final technical report under Contract AF 08(616)-56, by William S. Wilcox. Southern Research Institute, Birmingham, Ala. Feb 1957. 19p diagrs. Order from LC. Mi $2.40, ph $3.30. PB 132562

The purpose of this project was to investigate the feasibility of using the microwave absorption properties of oxygen to measure sudden fluctuations in the oxygen content of a mixture of air and other gases entering the intake of jet aircraft. AD 116522. AF AC TR 57-20.

Rapid detection of phthalic acid isomers and benzoic acid in alkyd resins by infrared absorption spectrometry, by M. L. Adams. U.S. Aberdeen Proving Ground. Coating and Chemical Laboratory, Aberdeen, Md. Oct 1957. 21p graphs, tables. Order from OTS. 75 cents. PB 131540

The object of this investigation was the development of an infrared-qualitative method for the analysis of alkyd resins for the isomeric phthalic acids and benzoic acid. For reports nos. 25, 26 and 32 see PB 131291, 131292 and 131539. Appendix A. - Tables. - Appendix B. - Graphs. Ordnance project TB 4-006D. DA project 593-32-006. APG CCL R 33.

Rapid determination of polyacrylonitrile in coatings by infrared absorption spectrometry, by Martha L. Adams. U.S. Aberdeen Proving Ground. Coating and Chemical Laboratory, Aberdeen, Md. Oct 1957. 17p graphs, tables. Order from OTS. 50 cents. PB 131539

The object of this method is the quantitative determination of polyacrylonitrile in resin solutions. The procedure involves quantitative dilutions of known acrylonitrile resin solutions and scanning the spectra from 3 - 6 u and the preparation of a standard curve in which the absorbances due to the nitrile group are plotted against the percentage concentrations of acrylonitrile. Unknown coatings can then be analyzed in an identical manner, the polyacrylonitrile being determined from the standard working curves. DA project 593-32-006, 5th report. Project TB 4-006D. Appendix A. - Tables. Appendix B. - Graphs. For Reports nos. 25, 26 and 33 see PB 131291, 131292 and 131540. APG CCL R 32.

Research on the water content of systems undergoing nitration. Summary report under Contract DA 36-061-501-ord-517, by Thomas B. Hoover and A. Witt Hutchinson. Applied Science Laboratories, Inc., State College, Pa. Jan 1957. 6p. Order from LC. Mi $1.80, ph $1.80. PB 132046

The objective of this research was to develop a method for the estimation of small amounts of water in systems undergoing nitration. In this procedure the sample, dissolved in glacial acetic acid, is titrated with a solution of acetic anhydride in this solvent. The end point is indicated by an abrupt change in the variation of specific conductance of the solution with further additions of the titrant. Army Ordnance project TA 3-5001.

Spectrographic determination of magnesium in cast iron, by R. G. Bernier. Associated Engineers, Inc., Springfield, Mass. Jun 1957. 12p graph. Order from OTS. 50 cents. PB 131545

An investigation was made to determine the best parameters for the determination of magnesium in cast iron. Under the most suitable conditions found, it is possible to obtain an accurate analysis over the desired concentration range of 0.02 percent to 0.1 percent. Contract DA 19-059-504-ord-2548. SA TR 16-1112.

X-ray absorptimetry in systems of light elements. Final report on Project A-070 (Contract AF 18 (600)-1563) for period 1 Dec 1955-30 Nov 1956, by D. Greenberg. Armour Research Foundation. Physics Research Dept., Chicago, Ill. Feb 1957. 38p photos, diagrs, graphs. Order from LC. Mi $3.00, ph $6.30. PB 127148

A proposed non-destructive quantitative analytical technique for determining the per cent composition of compounds composed of light elements which utilized the properties of the X-ray absorption coefficients of these elements has been investigated. Detailed descriptions are given of the apparatus used to obtain fairly intense collimated monochromatic X-ray beams by fluorescence excitation, as well as of the X-ray detection system. Data is presented to illustrate the stability and reproducibility of the apparatus, and experimental results are given that support the feasibility and applicability of the method. AD 120423. Chem 40-28. Contract AF 18(600)-1563, Final report. AF OSR TR 57-13.

Miscellaneous Chemicals

Flame properties and the kinetics of chain-branching reactions, by J. Calvin Giddings and J. O. Hirschfelder. Wisconsin. University, Madison, Wis. May 1956. 33p diagr, graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 133030

In this paper, calculations have been made of the flame velocity and chemical profiles for the prototype chain-branching system with a second order chain-breaking step. Project Squid. Contract N6 ori-105, T.O. 3, NR 098-038. WIS ONR 3.

Weak intermolecular interactions and the infrared spectra of binary solutions, by E. E. Ferguson. U.S. Naval Research Laboratory. Sep 1957. 9p diagrs, graphs, tables. Order from LC. Mi $1.80, ph $1.80. PB 132879

The peak intensities of a number of infrared absorption bands corresponding to forbidden vibrational transitions were measured in liquid solution. The intensities in solution are found to exhibit an internally consistent relationship which can be considered roughly as an "inertness" scale. That is, the inactive vibration band intensities are a crude measure of the intermolecular cohesive forces in solution. This is demonstrated by a correlation of infrared absorption intensities with such physical parameters of the liquids as surface tension, solubility parameter, and polarizability. Integrated intensities and band half widths of the 850-kayser inactive fundamental of benzene in carbon disulfide, methylene iodide, and normal decane solutions were also measured. NRL R 5008.

ELECTRICAL MACHINERY

Communication Equipment

Design and development of telephone repeater TA-258/GT. Final report for the period Apr 1953-Oct 1955, under Contract DA 36-039-sc-52619, by R. M. Hultberg, V. H. Kiebler, and E. B. DuBois. International Telephone and Telegraph Corporation. Kellogg Switchboard and Supply Company, Chicago, Ill. Nov 1955. 61p diagr (part fold), graphs. Order from LC. Mi $3.90, ph $10.80. PB 127379

Dept. of the Army project: 3-21-08-022. Signal Corps project: 542F. Includes reports of eight conferences held during period of Contract.
1. TA-258/GT (Telephone repeater) 2. Repeaters, Telephone - Design 3. Repeaters, Telephone - Tests

Evaluation and optimization of digital communication systems. Part II: 2nd scientific report covering the period 15 Apr-15 Jul 1957, by S. S. L. Chang, B. Harris, and others. New York University. College of Engineering. Research Division, University Heights, N.Y. Aug 1957. 153p diagrs, graphs (1 fold), tables. Order from LC. Mi $5.70, ph $24.30. PB 132096

The concept of non-truncated decision feedback is applied to the problem of "fast" fading due to the scatter-multipath phenomenon. A Rayleigh distribution of signal strength is assumed. It is shown that, by suitably varying the null level as a function of the signal-to-noise ratio, a trade-off between error probability and transmission time exists which is just as favorable as that for the corresponding fixed-strength and fixed-null-level case, and which surpasses the latter for moderately large values of normalized transmission time. Comparisons are made with a number of systems which might reasonably be employed in the absence of this technique. AD 117272. Contract AF 19(604)-1964, Second scientific report. AF CRC TN 57-555, Part 2.

Long range v-h-f meteor-burst communication system, by Russell Wolfram and Bruce M. Sifford. Stanford Research Institute, Menlo Park, Calif. Sep 1957. 55p photos, diagrs, graphs. Order from LC. Mi $3.60, ph $9.30. PB 132115

A v-h-f teletype communications circuit has been established from Bozeman, Montana, to Palo Alto, California, using radio signals reflected from ionized meteor trails. The great circle distance between these two points is approximately 830 miles. This report discusses the design and operation of a teletype system which detects these reflected paths and controls the flow of information coincident with an acceptable signal strength from transmitter to receiver. The information is transmitted during meteor bursts at ten times the normal 60-wpm teletype rate. It is recorded and stored at the receiver and then read out at normal speed into standard teletype printers. Scientific report 5. Contract AF 19(604)-1517. AF CRC TN 56-567. SRI Proj. 1422.

Electronics

Absorption and transmission of electromagnetic waves. Göttingen. Universität. Physikalisches Institut. Contract AF 61(514)-1041. Order separate parts described below from LC, giving PB number of each part ordered.

Phase A: Absorption of microwaves by multiple resonance absorbers, by H. J. Schmitt. Jul 1957. 41p diagrs, graphs, table. Mi $3.30, ph $7.80. PB 132767

The behavior of one, two and three-circuit resonance absorbers has been investigated with respect to the frequency dependence of the reflection factor. Computations of the reflection factor have been carried out using an approximate equivalent circuit representation for the simple 377-ohms foil absorber, the two-circuit dipole resonance absorber and the three-circuit absorber consisting of two dipole gratings attached parallel to the front of a conducting wall and at fixed distance from it. AD 131361. AF RADC TR 57-185A.

Phase B: Absorption of microwaves by magnetic absorbers, by F. Wiekhorst. Jul 1957. 27p photos, diagrs, graphs. Mi $2.70, ph $4.80. PB 132768

The paper describes an absorber arrangement

for electromagnetic cm-waves. The well-known $\pi/4$ absorber has been improved by the application of dissipative foils with resonance slots. These slotted foils allow the manufacturing of absorbers with extremely small thicknesses. The band width of effectiveness of such absorbers is very small, but can be widened by combining the low-tuned resonance slots, acting as magnetic dipoles with higher tuned electric dipoles which are suitably damped. AD 131362. AF RADC TR 57-185B.

Phase C: Absorption of electromagnetic cm-waves in anisotropic media, by Reinhard Pottel. Jul 1957. 29p diagrs, graphs. Mi $2.70, ph $4.80. PB 132769

It has been investigated up to which frequencies the permeability can reach the magnitude of the dielectric constant, using ferrites as ferromagnetic semi-conductors. The reflection coefficient has been measured as a function of frequency, the transmission coefficient has been determined for the case of minimum reflection and the permeability has been determined as a function of the strength of the magnetostatic field as a fixed frequency. AD 131363. AF RADC TR 57-185C.

Phase D: Diffraction of electromagnetic waves by perfectly conducting or absorbing semi-infinite screens, by H. Severin. Jul 1957. 46p graphs, tables. Mi $3.30, ph $7.80. PB 132770

For the perfectly conducting half plane a second-order approximation has been reported which, in contrast to the first-order approximation, gives a very good agreement with the exact solution, now for the entire boundary surface. Some experimental results received with perfectly conducting and absorbing screens are reported. AD 131364. AF RADC TR 57-185D.

Phase E: Application of methods of architectural acoustics to electromagnetic waves, by S. Vogel. Jul 1957. 25p diagr, graphs. Mi $2.70, ph $4.80. PB 132771

The absorption coefficient of cm-wave absorbers is determined with statistically distributed angles of incidence and polarization of the waves from the "reverberation time" of the electromagnetic energy in an echo box. As a second measure for the absorption coefficient, the decrease of the stationary energy density is used, which is observed when absorbing materials are introduced into the cavity for constant energy input. AD 131365. AF RADC TR 57-185E.

Air navigation by radar in southeastern Alaska, by R.C. Borden. U.S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Feb 1951. 15p photos, maps, diagr. Order from LC. Mi $2.40, ph $3.30. PB 132681

1. Radar, Airborne - Installation - Alaska
2. Radar, Airborne - Tests - Alaska
3. Navigation, Aerial - Equipment 4. CAA TDR 65

Backward-wave local oscillators. Final report including 8th quarterly progress report covering the period 1 Feb-1 May 1956, under Contract DA 36-039-sc-56763, by M.R. Currie, H.R. Johnson, and R.D. Weglein. Hughes Aircraft Company. Research Laboratories. Electron Tube Laboratory, Culver City, Calif. Jun 1956. 38p photos, diagrs, graphs. Order from LC. Mi $3.00, ph $6.30. PB 132497

The purpose of this contract was to investigate and develop backward-wave oscillators at X-band (7.6 to 12.4 kMc) and Ku-band (11.6 to 18.0 kMc) that would meet certain rigid objective specifications. The first and principal phase of this contract on backward-wave oscillators is summarized in Part I of this Final Report. The investigation of noise reduction is described in Part II. AD 109497. Report BW-8-F. D.A. project 3-30-11-943. Signal Corps project 1194C.

Bibliography of reports and technical publications of Electrical Engineering Research Laboratory University of Texas. See entry under Bibliography on page 125. PB 132068

Brief report on results obtained during 1956 from work carried out on Contract Nonr-1129(00), NR 036-012. Polytechnic Institute of Brooklyn, Brooklyn, N.Y. Dec 1956. 6p. Order from LC. Mi $1.80, ph $1.80. PB 132026

The work on this project through 1956 has been continued along the same general lines as in previous years as a study of adsorption of polyvinyl acetate and related polymers, and further as investigations of the complex chemistry of the chromium phosphate wash primer.

Characteristics of radar sea clutter. Part I: Persistent target-like echoes in sea clutter, by F.C. MacDonald. U.S. Naval Research Laboratory. Mar 1957. 11p photos, table. Order from LC. Mi $2.40, ph $3.30. PB 124676

The X-, S-, and L-band radars in the NRL Flying Laboratory measured sea clutter off Bermuda in October 1955 and January 1956 transmitting either vertical or horizontal polarization and generally with both polarizations received and recorded in separate channels. This report, on one phase of the measuring program, deals with spikyness, the tendency of

clutter to become resolved into individual target-like echoes. NRL R 4902.

Circuit parameters of the tuning post in a rectangular waveguide and its applications, by Michio Suzuki. Polytechnic Institute of Brooklyn. Microwave Research Institute, Brooklyn, N.Y. Jul 1957. 61p diagrs, graphs. Order from LC. Mi $3.90, ph $10.80. PB 132147

This paper is concerned with the theoretical treatment of the circuit parameters of a tuning post in a rectangular waveguide and some applications of the results to the approximate calculation of the circuit parameters of a radiating post in a trough guide and a resonant slot in a strip line. AD 133704. Contract AF 19(604)-2031. PIB R 519. PIB R 591-57. AF CRC TN 57-764.

Circuit properties of hook transistor, by L.M. Vallese. Polytechnic Institute of Brooklyn. Microwave Research Institute, Brooklyn, N.Y. Mar 1957. 28p diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 132956

The following significant novel results are obtained: a) the switching speed of hook common base circuits is much larger than that of hook common emitter circuits. Compared to the speed of similar circuits using point contact transistors with the same alpha cutoff frequency, it is somewhat lower; b) the amplifying properties of hook common emitter and hook common collector configurations are unique; in particular a stable unilateral amplifier may be designed with very large input impedance, very low output impedance and good transfer gain. The input impedance may also be adjusted to a preset value in a wide range, thus permitting input matching. The dual case (infinite input admittance, zero output admittance) may be synthesized similarly with a hook common base amplifier using positive feedback. Contract Nonr-839(05), NR 375-216. PIB 490. PIB R 562-57.

Comparative tests of vertically and circularly polarized airport traffic control transmitting antennas, by S.E. Taggart. U.S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Sep 1948. 9p photos, graphs. Order from LC. Mi $1.80, ph $1.80. PB 132687

1. Antennas, Transmitting 2. Airports - Control towers - Transmitters 3. CAA TDR 84

Comparison of backlash and hysteresis effects in autonomous second order feedback systems, by L.M. Vallese. Polytechnic Institute of Brooklyn. Microwave Research Institute, Brooklyn, N.Y. Feb 1956. 18p diagr, graphs. Order from LC. Mi $2.40, ph $3.30. PB 127249

The different behaviors of a second order feedback control system of autonomous type, with backlash or with hysteresis in the feedback branch of the loop, are investigated. Approximate expressions of the stability limits and of the amplitude and frequency of the oscillations are derived. Contract Nonr-839 (15), NR 375-214. PIB 398. PIB R 468-56.

Complete classical picture of the parallel plane diode, by W.G. Rosen. Illinois. Engineering Experiment Station. Electrical Engineering Research Laboratory, Urbana, Ill. Jul 1956. 52p graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 127467

1. Vacuum tubes, Diode - Theory
2. Contract Nonr-1834(08), NR 373-182, Technical report no. 2

Compressible two-dimensional jet mixing at constant pressure, by H.H. Korst, R.H. Page, and M.E. Childs. Illinois. Engineering Experiment Station. Mechanical Engineering Dept., Urbana, Ill. Apr 1954. 28p diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 132044

An analysis is made of turbulent constant pressure mixing for a compressible jet boundary, taking into consideration effects of the initial boundary layer. Velocity profiles in the mixing region are represented in a transformed plane by one-parameter families of curves, with no specification for the mixing mechanism beyond that of an exchange coefficient concept being made. The exchange coefficient is represented by the kernel function of an integral transform for the x coordinate of an intrinsic system of coordinates. This intrinsic system and the physical coordinate system are related by means of a momentum integral. AD 32990. ME Technical note 392-1 under Contract AF 18(600)-392: Transonic and supersonic flow of a real fluid at abrupt increases in cross section. AF OSR TN 54-82.

Dependence of dielectric constant on density of aggregates, by Robert S. Smith. Pennsylvania. University. Dept. of Physics, Philadelphia, Pa. Apr 1955. 91p photos, diagrs, graphs, tables. Order from LC. Mi $5.40, ph $15.30. PB 127039

An experimental method for measuring the dielectric constant and conductivity of powders is described. Results of measurements are given for several powders as a function of powder density. Numerous formulae of earlier workers pertaining to the dielectric constant of porous media are discussed. It is then shown that these relations incorrectly predict a value of the intrinsic dielectric constant which is a function of density. A calculation is presented which expresses the effective dielectric constant of a given system as a function of particle shape, intrinsic dielectric constant, powdered density, and packing properties of the powders. Thesis - University of Pennsylvania. Contract N6 onr-24914, Technical report no. 12.

Determination of prefabricated line lengths for C.A.A. localizers, by S.E. Taggart and V.E. Willey. U.S. Civil Aeronautics Administration. Technical Development Service. Indianapolis, Ind. Dec 1947. 26p photos, diagrs, graph, tables. Order from LC. Mi $2.70, ph $4.80. PB 132680

1. Antennas, Loop - Tests 2. CAA TDR 59

Development of a DME antenna transfer switch, by John R. Hoffman, Robert E. Carlson, and Warren E. Haworth. U.S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. May 1953. 7p photo, diagrs, tables. Order from LC. Mi $1.80, ph $1.80. PB 132712

1. Switches, Antenna 2. Distance measuring equipment - Components - Design 3. CAA TDR 201

Development of an improved VOR/TVOR monitor, by R.A. Forcier and W.H. Klein. U.S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Jun 1955. 17p photos, diagr, graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 132732

1. Monitors, Radar - Design 2. CAA TDR 271

Development of dielectric materials, by Charles L. Petze, Jr. and Eugene J. Lorand. Delaware Research and Development Corporation, Wilmington, Del. Contract Nonr-1689(00). Order separate parts described below from LC, giving PB number of each part ordered.

1st quarterly interim engineering report covering period 1 May - 31 Jul 1955. Sep 1955. 85p tables. Mi $4.80, ph $13.80. PB 133039

The purpose of the work is to develop light weight, low loss, weather resistant variable index of refraction dielectric materials. This problem may be divided into four phases: (1) Produce one or more cellular matrices; (2) Increase at will their dielectric constants; (3) Form lens components; (4) Weather-proof the lens. In addition to the target specifications, chemical and physical criteria applicable generally in selecting microwave dielectric materials are discussed and used. Sixteen polymeric materials and their foams are analyzed. Four methods for reducing the dielectric constant of a solid polymer are considered. Five methods for increasing dielectric constant are analyzed. The use of silicones as compounding ingredients and of silicone and methyl methacrylate surface coatings to provide weather resistance is considered. AD 82684.

Second quarterly interim engineering report for the period 1 Aug to 31 Oct 1955. Dec 1955. 35p tables. Mi $3.00, ph $6.30. PB 132023

The primary problem requiring solution at the beginning of the second quarter was development of a method for forming structurally useful sheets from cellular dielectric material. Foamed polyethylene sheet stock and cellular polystyrene logs and boards are not available commercially in a form convenient for modification with high dielectric constant additives or other compounding ingredients. AD 91064. Appendix D. Dielectric materials for the microwave antenna lens, by Charles L. Petze, Jr. (Paper presented at National Research Council Conference on Electrical Insulation, Pocono Manor, Pa., Oct 19, 1955.

Third quarterly interim engineering report for the period 1 Nov 1955-31 Jan 1956. Apr 1956. 23p. Mi $2.70, ph $4.80. PB 132025

The problem selected for major consideration was investigation of additives based upon titanium compounds for increasing the dielectric constant of expanded polystyrene bead structures, including consideration of means of securing a favorable distribution of the additive in the matrix structure. Work was necessary on the use of live steam expansion of polystyrene beads as an alternate to radiant heat to obtain more readily controlled, more uniform and lower density matrix material and on the use of silicones as modifying the protective agents, to facilitate forming structurally useful sheets and to provide weather resistance. AD 95796.

Fourth quarterly interim engineering report for the period 1 Feb to 30 Apr 1956. May 1956. 25p tables. Mi $2.70, ph $4.80. PB 132024

The primary problem selected for continued investigation during the fourth quarter was a suitable method for increasing the dielectric constant of light weight polystyrene structures. The target specifications of the project are given in Appendix A. AD 97662.

Development of high-power, traveling-wave and hybrid tubes. Stanford University. W.W. Hansen Laboratories of Physics. Microwave Laboratory, Stanford, Calif. May 1957. 31p photo, diagrs, graphs. Order from LC. Mi $3.00, ph $6.30. PB 132577

The clover-leaf traveling-wave tube has been hot tested. Some cold-test work has been done on a loop-coupled structure which appears to be quite promising. The eight-cavity klystron which has been built for this project has operated at 1.5 megawatts peak

with a beam voltage of 115 kv. In the gridded-gun project, tests were made on the L-band tube after it had been rebuilt by changing the method of mounting the grid ring, and by increasing the cathode-anode spacing 1/8 in. This rebuilt tube aged satisfactorily up to 110 kv. Tests were made of the noise output from the tube during the interval between pulses to establish the allowable level of thermionic electron emission from the grid. AD 117091. Covers work from 15 Jan-15 Apr 1957 under Contract AF 19(604)-1924. Scientific report 3. SU ML R 405. AF CRC TN 57-386.

Diffraction by an infinite slit, by Harold Levine. Stanford University. Applied Mathematics and Statistics Laboratory, Stanford, Calif. Jan 1957. 30p graphs. Order from LC. Mi $2.40, ph $4.80. PB 132474

The diffraction of plane waves by an infinite slit is investigated, with attention drawn to the case of grazing incidence and for wave lengths short compared to the slit width. The wave pattern is time harmonic and two-dimensional, with identical behavior in all planes normal to the slit axis. Contract Nonr-225(11), NR 041-086. SU AMSL TR 61.

Diffusion on ionic compounds, by T. J. Gray, B. D. James, and E. A. Giess. New York State College of Ceramics, Alfred, N.Y. Mar 1957. 96p diagrs, graphs, tables. Order from LC. Mi $5.40, ph $15.30. PB 127266

Discusses various theories of diffusion, methods of studying diffusion, and includes a bibliography of 237 references. Project R 355-20-18. Contract AF 18(600)-1448.

Effect of ferrite sample size on the frequency shift of a microwave resonant cavity, by J. E. Tompkins and E. G. Spencer. U.S. Ordnance Corps. Diamond Ordnance Fuze Laboratories, Washington, D.C. Jan 1957. 22p graphs. Order from LC. Mi $2.70, ph $4.80. PB 132001

Expressions are derived for the frequency shift of a microwave resonant cavity resulting from the insertion of a sample of magnetic material small compared with the wavelength. Principal consideration is given to spherical samples. Cavity perturbation theory is used, the internal field in the sample being specifically calculated and used in the integration over the sphere. Results of the theory are compared with measurements and with the results of recent theoretical treatments of the problem. DOFL project 4403-41044. TA 3-9101B. DOFL TR 427.

Electromagnetic radiation patterns and sources, by Claus Müller. New York University. Institute of Mathematical Sciences. Division of Electromagnetic Research, New York, N.Y. Jul 1956. 10p tables. Order from LC. Mi $1.80, ph $1.80. PB 127213

AD 98790. Reprinted from Electromagnetic wave theory symposium, p. 224-232. 1. Waves, Electromagnetic - Radiation - Theory 2. Antennas - Radiation patterns - Mathematical analysis 3. Contract AF 19(122)-42 4. NYU RR EM 95 5. AF CRC TN 56-591

Electron scattering from aspherical nuclei, by B. W. Downs, D. G. Ravenhall, and D. R. Yennie. Stanford University. Dept. of Physics, Stanford, Calif. Feb 1957. 19p graphs. Order from LC. Mi $2.40, ph $3.30. PB 126911

Report no. 545-22. Project R-357-40-3. 1. Electrons - Scattering - Theory 2. Contract AF 18(600)-545 3. AF OSR TN 57-36 4. SU DP TR 22

Electron tubes for critical environments, by Walter H. Kohl and Philip Rice. Stanford Research Institute, Menlo Park, Calif. Mar 1958. 219p photo, diagrs, graphs, tables. Order from OTS. $3.50. PB 131852

The present state of development of electron tubes for operation at temperatures up to 500°C at high levels of shock and vibration and in nuclear radiation has been investigated. The data presented were gathered from published reports, the periodical literature, interviews, and by means of questionnaires. The materials and techniques that enter into electron tube design are examined separately, and the effects of high temperature are analyzed. Those areas of technology requiring further research are enumerated. AD 151158. Project 4156, Task 41668. Contract AF 33(616)-3460. AF WADC TR 57-434.

Final report summarizing research in rate of high-speed reactions under Contract AF 18(600)-1332, by Walter H. Wurster. Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y. Jan 1958. 23p photos, diagr, graphs. Order from LC. Mi $2.70, ph $4.80. PB 132041

This report discusses the principles of the single temperature pulse shock tube for the study of high-speed chemical reactions. This facility has been employed in an investigation of the kinetics of the $N_2 + O_2 \rightleftarrows 2\,NO$ reaction between 2000°K and 3000°K. These kinetics have been proven to be consistent with the chain mechanism proposed by Zeldovich. An activation energy of 74 ± 5 kcal/mole has been measured. A separate study of the relaxation time for oxygen dissociation at 2000 - 4000°K yielded values which confirm the validity of the chain mechanism for the NO reaction. The complementary use of high-speed spectrographic techniques in reaction studies is discussed. AD 148054. Contract AF 18(600)-1332, Final report. AF OSR TR 58-8. CAL AD 959-A-2.

Further studies of resonance phenomena at microwave frequencies in gyromagnetic gaseous discharge plasma: Application to radio frequency spectrum analysis, by L.P. McGrath, A.K. Chatterjee, and J.P. Monier. Illinois. University. Engineering Experiment Station. Electrical Engineering Research Laboratory. Gaseous Electronics Section, Urbana, Ill. Aug 1957. 93p photos, diagrs, graphs, tables. Order from LC. Mi $5.40, ph $15.30. PB 132099

The present study of resonance phenomena at microwave frequencies in gaseous discharge plasmas was made to explore, in particular, the possibility of using such plasmas for the purpose of spectrum analysis of radio frequency electromagnetic waves. The various resonances are classified in this report and a theoretical analysis for the case of linearly polarized waves, considering collisions, as well as for the circularly polarized waves, is given. AD 117097. Project 4156, Task 46310. Contract AF 19(604)-2152, Scientific report 2. AF CRC TN 57-389.

Heater-cathode leakage investigation. 6th quarterly report under Contract AF 19(604)-1734, by Julius Cohen, J.V. Florio, and others. Sylvania Electric Products, Inc. Physics Laboratory, Bayside, N.Y. Aug 1957. 27p diagr, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 132146

The purpose of this phase of the investigation is to measure the leakage characteristics under different life test conditions and also to see what correlations, if any, exist between the leakage measurements and certain tube characteristics. AD 133716. Report YD 57-5-6. Project no. 1111-1792. For 1st-3rd quarterly reports see PB 125151, 124715 and 126374. AF CRC TN 57-771.

High-frequency current distributions on conducting obstacles, by Lewis Wetzel. Harvard University. Cruft Laboratory, Cambridge, Mass. May 1957. 114p diagrs, graphs, tables. Order from LC. Mi $6.00, ph $18.30. PB 132098

The scattering problem can be solved exactly only for a small group of regular obstacles. Since the scattering problem may be viewed generally as a radiation problem from a prescribed source distribution, it is of interest to study the way in which current distributions are excited on the surface of a conducting body by an incident plane wave. In this report, the exact series expansion for the current on a circular cylinder is converted into another series in which each term is the sum of two integrals. When suitably approximated, these integrals assume a form similar to the integral approximation obtained by V. Fock. AD 117101. Contract AF 19(604)-786. AF CRC TN 57-391. HU CL SR-10.

Improved amplitude discriminator for vibration analysis, by Alois Mattes. U.S. Signal Corps Engineering Laboratories, Fort Monmouth, N.J. Sep 1956. 17p photo, diagrs (1 fold). Order from LC. Mi $2.40, ph $3.30. PB 132471

Signal Corps project 2232E. D.A. project 3-54-02-025. 1. Circuits, Discriminator - Design 2. Vibration - Analysis 3. SCEL TM 1798

Industrial preparedness study for diffused semiconductor devices. Interim feasibility report for the period 1 Jul-31 Dec 1956 under Contract DA 36-039-SC-72714. Transitron Electronic Corporation, Wakefield, Mass. Jan 1957. 215p photos, diagrs, graphs, tables. Order from LC. Mi $9.60, ph $33.30. PB 127423

Progress in establishing feasibility is reported on the following devices: germanium pulse transistor core driver; PNP and NPN audio silicon transistor, 2 watt output; silicon audio transistor, 5 watt output; silicon power transistor, 20 watt output; silcon pulse transistor or core driver; silicon transistor 4.3 Mc amplifier. Order no. 50823-Phila-56-81. Specification MIL-T-19500A. Contract DA 36-029-sc-727(14).

Industrial preparedness study on diffused semiconductor devices nos. 19, 23 and 28. Interim feasibility report for the period 1 Jul 1956-28 Feb 1957, under Contract DA 36-039-sc-72703, by William C. Brower, Charles Earhart, Harry L. Owens, and Willis A. Adcock. Texas Instruments Inc., Dallas, Tex. Mar 1957. 82p drawings, diagrs, graphs, tables. Order from LC. Mi $4.80, ph $13.80. PB 127412

A method for diffusion of an extremely thin, uniform P layer during growth of a silicon crystal is described. This grown-diffused NPN crystal structure makes possible the production of silicon transistor devices with alpha cutoff values as high as 350 megacycles. The grown-diffused transistor structure is explained in detail as the design capable of meeting 70-mc amplifier requirements. Complete fabrication methods of present state-of-the-art transistors are given, together with a summary of the electrical performance of typical units. Methods for calculation of 70-mc power gain are compared with direct gain measurement techniques. Specification MIL-T-19500A. For other report see PB 126255.

Industrial preparedness study on power transistors. Final report for the period 7 Jan 1954-31 Jan 1957 under Contract DA 36-039-sc-46613, by E.J. Quirk. Clevite Corp. Clevite Transistor Products Div., Waltham, Mass. 1957. 188p photos, drawings, diagrs, graphs, tables. Order from LC. Mi $8.40, ph $28.80. PB 132572

The primary object of this Contract was to develop a pilot line for the production of audio frequency transistors capable of handling power in the range

from 1 to 10 watts. The capacity of this pilot line was to be 3,000 starts and approximately 1,650 finished units per day. A further object of the Contract was to provide whatever services, materials, equipment, facilities, and other essentials might be required to obtain Signal Corps Engineering Laboratory approval of this pilot line and of a pilot production run made with this line. A third object of this Contract was to perform the engineering necessary to establish production designs of power transistors; to establish manufacturing techniques; to design, develop and procure semi-automatic machinery for producing power transistors; and to determine machine operations for mass production of approved standardized power transistors.

Industrial preparedness study on super "X" band diodes. 9th quarterly progress report covering the period 26 Mar-25 Oct 1957, under Contract DA 36-039-sc-66039, by H. Ellowitz and A. Bruno. Microwave Associates, Inc., Burlington, Mass. Nov 1957. 21p. Order from LC. Mi $2.70, ph $4.80. PB 132561

1. Crystals, Silicon - Preparation 2. Vacuum tubes, Diode - Silicon

Intrinsic-barrier transistor techniques. Final technical report for the period 1 Apr 1955-31 Mar 1956, under Contract DA 36-039-sc-64661, edited by J. L. Buie. Pacific Semiconductors, Inc. Research and Development Dept., Culver City, Calif. Apr 1956. 67p photos, diagrs (1 fold), tables. Order from LC. Mi $3.90, ph $10.80. PB 127208

This investigation represents the first step in the development and establishment of techniques suitable for pilot production of high quality intrinsic-barrier transistors. Dept. of the Army project no. 323A. SCL 5035. Report 3000: 1-12-F.

Investigation of interference from radar modulators. Vol. II: Electromagnetic shielding principles. Final report under Contract AF 30(602)-401. Rensselaer Polytechnic Institute. Research Division, Troy, N.Y. Mar 1956. 129p diagrs, graphs, tables. Order from LC. Mi $6.30, ph $19.80. PB 130459

Includes Vol. I in table of contents. Vol. II deals with electromagnetic leakage from coaxial cables, estimation of required shielding, conducted interference and appendices on leakage from long slits, derivation of the calibration factor for surface transfer impedance measuring equipment, construction of a pressure chamber for gasket tests, and variation of cabinet attenuation with door size. AD 91298. AF RADC TR 56-43B.

Investigation of second harmonic interference from Station W9XZV on Chicago localizer and omni range frequencies, by Francis J. Gross and Hugh A. Kay. U.S. Civil Aeronautics Administration. Technical Development Service. Nov 1947. 8p graph, map. Order from LC. Mi $1.80, ph $1.80. PB 132678

1. Radio frequencies - Harmonics 2. Radio interference - Tests 3. CAA TDR 56

Investigation to determine the characteristics of horizontal and vertical polarization for very-high frequency two-course visual radio ranges, by J. M. Lee, R. G. Pamler, and B. M. Lahr. U.S. Civil Aeronautics Administration. Technical Development Service. Jul 1947. 63p photos, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 132679

1. Radio ranges (VHF) - Equipment 2. Polarization, Vertical 3. Polarization, Horizontal 4. CAA TDR 58

Ionosphere propagation studies. Scientific report no. 1-4 for the period 1 Mar-31 May 1956, under Contract AF 19(604)-1413, by Leonard C. Edwards. Raytheon Manufacturing Co., Waltham, Mass. Jun 1956. 51p graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 127065

Discusses focussing factor and backscatter, long distance propagation above the MUF, and accuracy of range determination based upon delay time measurements at a master station of a slave beacon located at an unknown range and percentage of time during which these measurements are possible on specific frequencies. For Scientific reports no. 1.1-1.2 see PB 122350 and 123408. AF CRC TN 56-579.

Junction-transistor high-frequency equivalent circuit, by R. D. Middlebrook. Stanford University. Electronics Research Laboratory, Stanford, Calif. May 1955. 255p photos, diagrs, graphs, tables. Order from LC. Mi $11.80, ph $39.60. PB 127226

A new junction transistor equivalent circuit, derived from theoretical principles and valid up to and beyond the alpha cut-off frequency, is presented. Two main results are achieved: first, it is shown how the behavior of a practical transistor depends on the geometry and physical properties of the transistor materials (of use to transistor designers); second, it is shown how the element values in the practical equivalent circuit may be determined numerically from six measurements made on a completed transistor (of use to circuit designers). The final equivalent circuit takes into account collector space-charge capacitance, collector space-charge-layer widening, and base resistance, and is in the form of four short-circuit admittances. Contract N6onr-251(07), NR 373-360. SU ERL TR 83.

Loop dipole analog, by F.D. Clapp and H. Masuda. California. University. Division of Electrical Engineering. Electronics Research Laboratory. Antenna Group, Berkeley, Calif. Jul 1956. 11p photos, diagrs, graph. Order from LC. Mi $2.40, ph $3.30. PB 127478

1. Dipoles, Slotted 2. Antennas, Dipole - Radiation patterns 3. Contract N7 onr-29529, Report 52 4. UC IER Series 60, Issue 159

Measurement of electric constants at a wavelength of four millimeters, by T. Morita, R.D. Kodis, and C. Shafer. Harvard University. Cruft Laboratory, Cambridge, Mass. May 1955. 28p photos, diagrs, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 127248

This report deals with the extension of conventional microwave cavity techniques for measuring electrical constants to the 4 mm wavelength region of the electromagnetic spectrum. Results are presented of measurements at this frequency of (1) the conductivity of machined silver and (2) the dielectric constant of polystyrene. The theoretical basis for the measurements is developed, and an estimate is made of the accuracy of the results. Contract N5-ori-76, T.O. 1, NR 372-012. HU CL TR 228.

Measurement techniques for multi-mode systems and the properties of half-wave slots in two-mode rectangular waveguides, by W.H. Kummer. California. University. Division of Electrical Engineering. Electronics Research Laboratory. Antenna Group, Berkeley, Calif. Apr 1955. 116p drawings, diagrs, graphs, tables. Order from LC. Mi $6.00, ph $18.30. PB 126791

Techniques are developed to measure the equivalent network parameters for obstacles in multimode waveguide transmission systems. An experimental system is set up for use with rectangular waveguide propagating TE_{10} and TE_{20} modes. All equivalent generators and transmission lines are terminated in their characteristic impedances. Particular application of these techniques is made to narrow half-wave resonant slots; both longitudinal and transverse slots located in the board face of the waveguide are employed. Contract N7 onr-295(29), Report no. 40. UC IER Series 60, Issue no. 135.

Multi-dimensional lattice arrays with arbitrarily distributed elements, by H. Unz. California. University. Division of Electrical Engineering. Electronics Research Laboratory. Antenna Group, Berkeley, Calif. Dec 1956. 45p diagrs. Order from LC. Mi $3.30, ph $7.80. PB 132005

Multi-dimensional lattice arrays with general arbitrarily distributed elements are discussed. A matrix relation is found between the elements of the two-dimensional array and its far-zone pattern. Analysis of the two-dimensional array from amplitude measurements of the pattern is given. The radiated power is calculated in terms of the interaction coefficients. Some features of the three-dimensional array are discussed and its interaction coefficient is calculated. Certain concepts of the linear array are extended to include multi-dimensional arrays. Contract N7 onr-29529, Report 57. UC IER Series 60, Issue 172.

New low-density artificial dielectric, by J.A. Carruthers. McGill University. Eaton Electronics Research Laboratory, Montreal, Canada. n.d. 57p graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 130871

The results are reported of an investigation into an isotropic, wide-band, artificial dielectric of low specific gravity for use at microwave frequency. Approximate relations for dielectric constant, permeability, and loss tangents are derived, and it is shown that experimental work to date support these formulae. AD 40090. Date is 1951 or later. Contract AF 19(122)-81.

Noise figure of traveling-wave tubes, by Charles Edward Muehe, Jr. Massachusetts Institute of Technology. Research Laboratory of Electronics Cambridge, Mass. Oct 1952. 40p photos, diagrs, graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 126994

This report describes experiments primarily designed to measure the noise in electron beams and traveling-wave tubes at 3000 Mc/sec. Based on a thesis, Massachusetts Insitute of Technology, Aug 1952. Dept. of the Army project: 3-99-10-022. Signal Corps project: 8-102B-0. Contract DA 36-039-sc-100. MIT RLE TR 240.

On the forward scattering from a dielectric sphere at high frequencies, by S.I. Rubinow. Harvard University. Cruft Laboratory, Cambridge, Mass. Aug 1956. 24p diagr, graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 126914

A study is made of the scattering of a scalar plane wave by a dielectric sphere at high frequencies. Attention is devoted in particular to the total scattering cross section. AD 98812. Contract AF 19(604)-786. HU CL SR 7. AF CRC TN 56-765.

Operating characteristics of the four-loop VOR antenna in the 108-Mc to 112-Mc band, by William L. Wright. U.S. Civil Aeronautics Administration. Technical Development and Evaluation Center. Indianapolis, Ind. Mar 1955. 8p diagrs, graphs, table. Order from LC. Mi $1.80, ph $1.80. PB 132730

1. Antennas, Loop - Tests 2. CAA TDR 257

Performance of S-band and L-band surveillance radars during rain and cloud conditions, by A.W. Randall, C.C. Trout, J.E. Herrman, and Paul H. Leake. U.S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Apr 1949. 11p photos, diagr, graph, table. Order from LC. Mi $2.40, ph $3.30. PB 132691

1. Radar - Bands L 2. Radar - Bands S 3. CAA TDR 92

Phase comparison localizer, by S.E. Taggart and V.E. Willey. U.S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Jun 1950. 13p diagrs, graphs. Order from LC. Mi $2.40, ph $3.30. PB 132695

1. Antennas, Directive - Radiation patterns
2. CAA TDR 115

Potential difference between two symmetrical conductors rotating in a stationary field (U), by Chester Snow. U.S. Ordnance Corps. Diamond Ordnance Fuze Laboratories, Washington, D.C. Oct 1957. 25p diagrs. Order from LC. Mi $2.70, ph $4.80. PB 132418

When two conductors rotate in a uniform electrostatic field, the expression for their potentials or the current between them is found to take a simple form if both are bounded by surfaces of revolution and one is the mirror image of the other by reflection in the mid plane that is normal to their common axis, provided also that the axis of rotation in this mid plane intersects their axis of symmetry. The potentials and current depend upon the capacitance C between the two bodies and another constant D both of which may be determined experimentally. Formulas for computing these two constants from their radius and separation are obtained in the case of two spheres. TA 3-9101. DA 506-01-001. DOFL project 51050. DOFL TR 515.

Procedure for adjusting percentage modulation of test equipment used to calibrate ILS receivers, by Raymond A. Forcier and W.L. Weibert. U.S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Apr 1953. 13p photos, diagr, graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 132703

1. Radio receivers - Testing equipment - Calibration 2. CAA TDR 168

Quarterly scientific report no. 16, covering period 1 Apr-1 Jul 1957, under Contract AF 19(604)-786. Harvard University. Cruft Laboratory, Cambridge, Mass. Jul 1957. 4p. Order from LC. Mi $1.80, ph $1.80. PB 132113

AD 133635. For reports 7-13 see PB 117771, 118497, 122355, 125191, 123464, 125152 and 126298. 1. Waves, Electromagnetic - Scattering - Theory 2. Cylinders, Circular - Current distribution 3. AF CRC TN 57-590

Radar ignition of photoflash lamps, by A.W. Randall. U.S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Nov 1948. 12p photos. Order from LC. Mi $2.40, ph $3.30. PB 132688

1. Lamps, Photoflash - Ignition - Tests
2. CAA TDR 87

Radio propagation measurements between Pikes Peak and Mount Evans at a wavelength of 4.3 millimeters, by C.W. Tolbert and A.W. Straiton. Texas. University. Electrical Engineering Research Laboratory, Austin, Tex. Nov 1956. 28p photos, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 130201

Also released under Contract AF 33(616)-2423, as report no. 5-19. 1. Radio waves - Propagation - Measurements 2. Radio waves - Propagation - Measuring equipment 3. Radio - Signals - Fading 4. Contract Nonr-375(01), NR 371-023 5. TU EERL 88

Realistic radar clutter simulator, by Jack Atkin and Henry Bickel. Columbia University. Dept. of Electrical Engineering. Electronic Research Laboratories, New York, N.Y. Apr 1957. 39p photos, diagrs, graphs. Order from LC. Mi $3.00, ph $6.30. PB 132097

In this report a simulator which produces signals having the same statistical properties as radar signals known as "clutter" is described. A description of these properties is included to provide a background for the clutter simulation system description. AD 117115. CU-10-57-AF-1572-EE. Contract AF 19(604)-1572. CUN ERI T-5/133. AF CRC TN 57-397.

Reflection and transmission of microwaves by thin metal films. Final technical report under Contract Nonr-991(02), by Vernon Crawford. Georgia Institute of Technology. State Engineering Experiment Station, Atlanta, Ga. Jun 1956. 17p diagrs, table. Order from LC. Mi $2.40, ph $3.30. PB 127356

The reflection and transmission coefficients of metal films are functions of film thickness. An investigation is carried out to determine (a) whether a measurement of the coefficients at microwave frequencies can be expected to yield accurate values of the thickness; (b) whether films of known thickness can be useful as waveguide components. Project A-241-2.

Representation of d-c characteristics and transient response of commercial semiconductor diodes, by F.S. Barnes. Stanford University. Electronics Laboratories, Stanford, Calif. Aug 1956. 52p diagrs, graphs. Order from LC. Mi $3.60, ph $9.30. PB 127923

This paper attempts to present in one place a reasonably complete analysis of the characteristics of commercial semiconductor diodes. The first portion of the paper is an analysis of the ideal p-n junction and the resulting distribution of carriers in the bulk of the diode. The second portion of the paper analyzes the deviations of the d-c characteristics of commercial diodes from the ideal p-n junction. The discussion of these deviations includes the effect of ohmic voltage drop through the bulk of the diode, the effect of high currents, and of the leakage currents. The final portion of the paper analyzes the transient response of these diodes in both the forward and reverse direction. The results of measurements of commercial diodes of both the forward and inverse transient response are presented and compared with the theory. Contract Nonr-225 (24), NR 373-360, Technical report no. 8. Contract N6 onr-251(07), NR 373-360.

Research on semiconductor films, by Allan Carlson. Clevite Corporation. Clevite Research Center, Cleveland, O. Jan 1956. 17p graph. Order from LC. Mi $2.40, ph $3.30. PB 132274

Cadmium sulfide films on rigid substrates were prepared by vacuum evaporation techniques and given large area electrode coatings exhibiting strong photovoltaic responses. Voltages produced were up to 0.63 volt. The cadmium sulfide films were polycrystalline, from 0.2 to 5 micorns thick, and were applied to metals or electrically conducting glass. The photosensitive electrodes consisted of extremely thin (about 0.1 micron) layers of cuprous oxide or sulfide; after forming contact with the cadmium sulfide film, these require activation by heat treatment. AD 97494. Project, Task 70832. Contract AF 33(616)-2782. AF WADC TR 56-52.

Rotating goniometer for the low frequency high power omnirange, by H. F. Keary. U.S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Jul 1949. 10p photos, diagr, graphs. Order from LC. Mi $1.80, ph $1.80. PB 132683

1. Radio range - Goniometers - Low frequency
2. Goniometers, Rotating 3. CAA TDR 70

Services, facilities and materials to conduct research and investigation into the origin of activity dips in the response of AT cut low frequency resonators, by J.M. Wolfskill and R.H. Tuznik. Bliley Electric Co., Erie, Pa. Contract DA 36-039-sc-63105. Dept. of the Army project no. 3-24-02-021. Signal Corps project 862A. Order separate parts described below from LC, giving PB number of each part ordered.

Second quarterly progress report covering period 15 Sep 1954-15 Apr 1955. May 1955. 24p graph, table. Mi $2.70, ph $4.80. PB 133056

1. Resonators, Crystal - Research
2. Crystals - Resonance - Measurement

4th quarterly progress report covering period 15 Oct 1955-15 Jan 1956. Feb 1956. 101p graphs, tables. Mi $5.70, ph $16.80. PB 130474

AD 96367. 1. Frequency modulation - Spectra 2. Resonators, Low frequency

Site survey for microwave relay systems, by Hugh N. Siegel. U.S. Air Force. Air Research and Development Command. Rome Air Development Center, Griffiss Air Force Base, N.Y. Sep 1957. 19p. Order from LC. Mi $2.40, ph $3.30. PB 132427

This report has been prepared to present the current status of conducting rapid site surveys. It includes a background of the present RADC task, the findings and suggestions of other activities concerned with site surveying, a brief comparison of known methods of surveying for this purpose, and a Bibliography on microwave surveying which is incomplete but which may assist others to acquire a knowledge of site-survey. AD 131234. Project 4518, Task 45258. AF RADC TN 57-291.

Sølion; principles of electrochemistry and low-power electrochemical devices. U.S. Naval Ordnance Laboratory. 1957. 50p photos, drawings, graphs, tables. Order from OTS. $1.25. PB 131931

The sølion is an electrochemical device based on the principle of concentration polarization. Essentially it is composed of a plastic cylinder with flexible end walls, and containing a solution of potassium iodide and iodine. In this solution several platinum or other noble metal electrodes are immersed. Polarization is by means of a low voltage (0.9v) battery. Stimulation of the diaphragms at each end causes an hydraulic flow which results in current flow. This process is reversible. The unit is sensitive to stimulation by heat, light, sound, pressure, and motion.

Some properties of lumped-filtered circuits for traveling-wave tubes, by Chih Tang Sah and G.A. Loew. Stanford University. Electronics Laboratories, Stanford, Calif. Jul 1956. 169p diagrs, graphs, table. Order from LC. Mi $7.80, ph $25.80. PB 127464

This report presents a family of curves of the properties of lumped-filter circuits which are useful as slow-wave circuits for external-circuit traveling

wave tubes with distributed or lumped and distributed circuits. Contract N6 onr-225(24), NR 373-360, Technical report no. 4.

Some results in the estimation of signal parameters, by D. R. Bennion. Stanford University. Electronics Laboratories, Stanford, Calif. Sep 1956. 23p graphs. Order from LC. Mi $2.70, ph $4.80. PB 128701

This memorandum summarizes some results obtained in the study of certain aspects of signal reception in the presence of noise. Two types of difficulties are considered, as explained below. First, the problem of obtaining best estimates of pulse heights occurring with certain non-Gaussian distributions is treated. The solution in each case implies some nonlinear filtering operation. Second, pulse trains with Gaussian statistics but inter-dependence between adjacent pulses are considered. The "best" estimate of any pulse height is found to be a certain linear combination of the present and previous signal samples. Some suggestions for extending this result to the case of inter-dependence between an arbitrary number of pulses are included. Contract Nonr-225(24), NR 373-360.

Stabilized local-oscillator performance evaluator, by A. W. Randall and O. E. McIntire. U.S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Dec 1954. 21p photos, diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 132727

1. Radar, MTI - Components - Design
2. Oscillators, Microwave - Testing equipment
3. CAA TDR 249

Statistical analyses of selected tropospheric microwave refractive index recordings, by R. M. McClure and H. W. Smith. Texas. University. Electrical Engineering Research Laboratory, Austin, Tex. Jul 1957. 28p graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 132576

Selected samples of microwave refractive index recordings taken with a Crain refractometer have been analyzed for the purpose of further examining the statistical nature of the recorded fluctuations. For the longest samples available covering ranges up to 30 miles, the rms of the fluctuations continued to change as a function of sample length indicating that the refractive index fluctuations do not represent statistically stationary data. AD 117077. Contract AF 19(604)-2249, T.O. 46032. TU EERL 6-22. AF CRC TN 57-375.

Study of the effects of processing techniques and materials on aging of quartz crystal units. Quarterly report no. 1, covering the period 15 May - 15 Aug 1955, under Contract DA 36-039-sc-64613, by Richard B. Belser and Walter H. Hicklin. Georgia Institute of Technology. State Engineering Experiment Station, Atlanta, Ga. Sep 1955. 58p photos, graphs, table. Order from LC. Mi $3.60, ph $9.30. PB 132750

By the induction heating of an HC-6/U metal envelope to a temperature of 800°C at a pressure of 10^{-2} mm of mercury, it was found that a large quantity of metal vapor, identified as zinc, distilled from the can. It is suggested that the HC-6/U can be fabricated from a metal or alloy not subject to volatilization at temperature or pressure combinations to which the resonator is likely to be subjected during its mounting or operation. By similarly heating in dry nitrogen an HC-6/U can, the interior of which had been coated with an enamel frit, it was found possible to deposit an enamel glaze on the inner surface of the can. Thirty-two resonators of 10- to 16-mc fundamental frequency were plated with sputtered rhodium. AD 82522. DA proj 3-24-02-021. Signal Corps proj 862A.

Study of the generation and detection of electromagnetic waves in the millimeter wave region, by J. H. Rohrbaugh. New York University. Washington Square College of Arts and Sciences. Dept. of Physics, New York, N.Y. Jun 1957. 31p tables. Order from LC. Mi $3.00, ph $6.30. PB 132116

Theoretical calculations are presented for the treatment of the echelette grating including the finite conductivity of the material. The boundary conditions used in the approximate solution of the grating are examined to discover whether a more general type of condition will yield better agreement with experiment. The current status of bolometer experiments, of the construction of the new spectrometer and the experiments regarding magnetron harmonics are also presented. AD 117282. Scientific report no. 8 covering period 1 Mar 1957-31 May 1957 under Contract AF 19(604)-1115. AF CRC TN 57-561.

Terminal VHF omnirange marker, by T.S. Wonnell and B. H. Boyle. U.S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Nov 1954. 30p photos, drawing, diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 132729

1. Radio range (VHF) - Equipment
2. CAA TDR 252

Theoretical and experimental study on the millimeter-wave cavity Barkhausen-Kurz oscillator, by Michiyuki Uenohara. Ohio State University Research Foundation. Dept. of Electrical Engineering, Columbus, O. Aug 1956. 225p photo, diagrs, graphs, tables. Order from LC. Mi $9.90, ph $34.80. PB 132022

A higher efficiency, a wider electronic tuning range, and a low starting current are the important characteristics of the magnetically-focused Barkhausen-Kurz oscillator. A theoretical and experimental

study on this oscillator has been conducted for the purpose of determining its potentialities as a millimeter-wave generator. The theoretical results are in substantial agreement with experimental results. AD 110349. Thesis - Ohio State University. Contract AF 18(600)-982. OSURF Proj 579, Report no. 3. AF OSR TN 56-530.

Theoretical consideration of an improved glide path antenna system, by Chester B. Watts. U.S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Mar 1949. 8p diagrs, graphs. Order from LC. Mi $1.80, ph $1.80. PB 132685

1. Landing, Instrument 2. Glide path equipment 3. CAA TDR 81

Theory and design of a traveling wave antenna system for long wave sweep frequency investigation of the ionosphere at vertical incidence, by C. F. Sechrist, Jr. Pennsylvania State University. Ionosphere Research Laboratory, University Park, Pa. Mar 1957. 52p diagrs, graphs. Order from LC. Mi $3.60, ph $9.30. PB 127480

The analysis, design, and evaluation of the new combination 75 kc/s folded dipole antenna, 225 kc/s antenna, and long wave sweep frequency transmitting antenna system being erected at the Scotia Field Station are discussed. AD 117183. Contract AF 19(604)-1304. PSC IRL SR 91. AF CRC TN 57-293.

Theory of the diamagnetism of Bloch electrons, by T. Kjeldaas, Jr. and Walter Kohn, Carnegie Institute of Technology. Dept. of Physics, and Westinghouse Electric Corporation. Westinghouse Research Laboratories, Pittsburgh, Pa. n.d. 35p. Order from LC. Mi $3.00, ph $6.30. PB 132028

Date is 1956 or later. 1. Electrons - Electromagnetic effects 2. Electrons - Energy - Theory 3. Electrons - Lattice interaction 4. Contract Nonr-760(13), NR 017-620, Technical report no. 2.

Transient phenomena in traveling-wave tubes, by A. V. Brown. Stanford University. Electronics Laboratories, Stanford, Calif. Jul 1956. 120p diagrs, graphs. Order from LC. Mi $6.00, ph $18.30. PB 127463

This investigation describes and analyzes some of the transient phenomena encountered on pulsing a traveling-wave tube (TWT). Two forms of pulse operation are considered. Contract Nonr-225(24), NR 373-360, Technical report no. 6. SU EL TR 6.

Transverse-current traveling-wave tube, by D. A. Dunn, W. A. Harman, L. W. Field, and G. S. Kino. Stanford University. Stanford Electronics Laboratories, Stanford, Calif. Sep 1956. 21p photo, diagrs, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 132008

Reprinted from the Proceedings of the IRE, vol. 44, no. 7, July 1956. Contents: Theory of the transverse-current traveling-wave tube, by D. A. Dunn, W. A. Harman, L. M. Fields, and G. S. Kino. Experimental transverse-current traveling-wave tube, by D. A. Dunn and W. A. Harman. Contract Nonr-225(24), NR 373-360. SU ERL TR 12.

Turbulence investigations in liquid shear flow by the method of electromagnetic induction, by L. M. Grossman and Huon Li. California. University. Institute of Engineering Research, Berkeley, Calif. Feb 1956. 73p photos, diagrs, graphs. Order from LC. Mi $4.50, ph $12.30. PB 132076

It is the purpose of this report to describe a method of component velocity fluctuation measurement in turbulent liquid flows based upon the induction of an electrical potential field in a continuous medium moving relative to a stationary uniform magnetic field. A thorough analysis of the theoretical basis of the proposed method is presented, as well as a description of the experimental application to the case of the measurement of the component velocity fluctuations in the fully developed turbulent flow of water in a circular pipe. AD 91533. Contract Nonr-222(22), Nil 062173. UC IER Series 65, Issue 2.

TVOR automatic-rebroadcast system, by Thomas S. Wonnell and Blanchard H. Boyle. U.S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. May 1955. 12p photo, diagrs, graph, table. Order from LC. Mi $2.40, ph $3.30. PB 132719

1. TVOR (Terminal omni-directional radio range) 2. Airports - Air traffic control 3. CAA TDR 232

V-type aircraft antenna, by Raymond E. McCormick, Blanchard H. Boyle, and Kennard E. Voyles. U.S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Feb 1952. 14p photos, diagrs, graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 132702

1. Antennas, Vee - Tests 2. Antennas, Aircraft - Design 2. CAA TDR 157

Variational calculations on ridge wave guides, by John M. Osepchuk. Harvard University. Cruft Laboratory, Cambridge, Mass. May 1955. 23p diagrs, graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 127246

A particular trial function is presented which is use-

ful in variational calculations of ridge guide properties. Such calculations for rectangular ridge guides are seen to agree well with earlier work by S.B. Cohn, in Proc. IRE, Aug 1947, p. 783-788. Contract N5 ori-76, T.O. 1, NR 372-012. HU CL TR 224.

Variational principles in high-frequency scattering, by Ralph D. Kodis. Harvard University. Cruft Laboratory, Cambridge, Mass. Aug 1956. 37p diagrs. Order from LC. Mi $3.00, ph $6.30. PB 126912

AD 98808. 1. Waves, Electromagnetic - Scattering - Theory 2. Contract AF 19(604)-786 3. HU CL SR 5 4. AF CRC TN 56-753

VOR flight calibration with C45 aircraft, by Thomas S. Wonnell. U.S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Jun 1949. 12p photos, graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 132692

1. C45 (Aircraft) 2. VOR (VHF omni-directional radio range) 3. CAA TDR 94

Generators, Motors, Transmission

D.C. generator immersion investigation, by Fred T. Drob. U.S. Arsenal, Detroit. Laboratories Division. Instrument-Electrical Laboratory, Center Line, Mich. Dec 1956. 15p photo, tables. Order from LC. Mi $2.40, ph $3.30. PB 132798

Investigation was made to determine the operating characteristics of a 300 ampere, D.C. generator under simulated fording conditions. Ordnance project TT1-720C. DA R 3772.

Design considerations for two types of transistorized multivibrator circuits (U), by P. Emile. U.S. Ordnance Corps. Diamond Ordnance Fuze Laboratories, Washington, D.C. Nov 1957. 19p diagrs, graphs. Order from OTS. 50 cents. PB 131538

This report outlines a procedure for selecting the circuit resistors and capacitors for transistor multivibrator circuits. The criteria used are: power output desired, frequency or pulse width desired, and the common-emitter current gain of the transistors. The design problems and circuits to eliminate them are given. Performance results for the basic circuits are also presented. Ordnance project TA 3-9101. DA project 506-01-001. DOFL project 50150. DOFL TR 487.

Design of push-pull single ended transistor amplifiers, by M.I. Plawsky. Polytechnic Institute of Brooklyn. Microwave Research Institute. Brooklyn, N.Y. Jun 1956. 43p diagrs, graphs. Order from LC. Mi $3.30, ph $7.80. PB 127143

The major advantage of a single-ended push-pull amplifier over a balanced push-pull amplifier is the fact that the former does not require a split-primary transformer in the output. It can be used to feed a single-primary transformer, a coil, or a resistor. Two such circuits are analyzed, one using a transformer driver, the other a transistor phase-inverter driver. Contract Nonr-839(05), NR 375-216. PIB R 502-56. PIB-432.

Development of miniaturized test equipment amplifier AM-1137(XW-1)/U. Final engineering report under Contract AF 30(602)-278, by Seymour D. Lerner. Polytechnic Research and Development Co., Inc. Brooklyn, N.Y. Aug 1954. 34p photo, diagrs (1 fold). Order from LC. Mi $3.00, ph $6.30. PB 130457

The amplifier has good sensitivity, large dynamic range, low noise, narrow and wide band frequency, selection and automatic gain normalization. The instrument is calibrated for use primarily as a VSWR indicator. It finds additional application, however, in measurement of attenuation and in general laboratory service. AD 90462. AF RADC TR 56-13.

High temperature, noble metal film type, sealed variable resistors. Final report for the period 1 Aug 1954-30 Apr 1955, under Contract no. DA 36-039-sc-64500, by Lawrence B. Krauss. Fairchild Camera and Instrument Corporation. Potentiometer Division, Hicksville, N.Y. Feb 1955. 72p diagrs, graphs, tables. Order from LC. Mi $4.50, ph $12.30. PB 127146

Metal film variable resistors developed under Contract DA 36-039-sc-5568 (PB 123209) were fabricated and tested for data on temperature cycling, vibration, salt spray, humidity exposure, load and rotational life, and seal test. AD 72898. Report no. 8623-2. Dept. of the Army project no. 3-26-00-600. Signal Corps project no. 2006A.

Linear high-gain amplifier for recording meters, by G.P. DuBose, Jr. and F.E. Brooks, Jr. Texas University. Electrical Engineering Research Laboratory, Austin, Tex. Nov 1956. 48p diagrs, graphs. Order from LC. Mi $3.30, ph $7.80. PB 130786

This report presents some basic material on D'Arsonval galvanometers and cathode-coupled amplifiers, leading to the design of practical amplifiers suitable for use as drivers for recording meters. Contract Nonr-375(01), NR 371-023. TU EERL 87.

Research and development on ultra-thermic 500°C capacitors, by Alvin L. Berg. Servomechanisms, Inc., Vacuum Film Products Division, El Segundo, Calif. Apr 1958. 86p photos, diagrs, graphs, tables. Order from OTS. $2.25. PB 131848

An exhaustive materials survey, including extensive testing, was performed to study dielectric properties of oxides of such materials as aluminum, magnesium, zirconium and mixtures of the oxides. This study included some other materials. Considerable data is included in the report covering the properties of these dielectrics which is of substantial value in itself in addition to being useful for the specific program involved. Experimental equipment was developed for fabricating sample capacitors in flat substrate form and also in tubular form. AD 151167. Project 4155, Task 41586. Contract AF 33(616)-3611. AF WADC TR 57-708.

250°C ceramic capacitor with wide temperature range, by Cameron G. Harman and Edward F. Mayer. Horizons, Inc., Cleveland, O. Mar 1958. 66p photo, diagrs, graphs, tables. Order from OTS. $3.00. PB 131893

New capacitors, with capacities up to 0.01 microfarad, were sought which would conform in general to the ratings described in MIL-C-11015A, with two important exceptions. These were (a) the reference temperature should be 250°C instead of 85°C, and (b) the insulation resistance sought would be in excess of 5 megohm microfarads at 200°C and 0.5 at 250°C. Products with desired capacities were developed with insulation resistances up to 6 megohm microfarads at 250°C and up to 50 megohm microfarads at 200°C. Final products were composed of 80.10 percent of barium titanate, 16.99 percent of lead titanate, and 2.91 percent of tantalum oxide. Processing methods employed resulted in higher degrees of mixing and far greater reproducibility than was possible by conventional procedures. AD 151112. Project 4155, Task 41562 (formerly Task 41594). Contract AF 33(600)-31966. AF WADC TR 57-383.

Miscellaneous

High rate discharge characteristics of lead-acid storage batteries, by Charles Derricotte. U.S. Arsenal. Detroit. Laboratories Division. Instrument-Electrical Laboratory Branch, Center Line, Mich. Oct 1956. 29p diagr, graphs, tables. Order from OTS. 75 cents. PB 131498

Tabulates the high rate discharge characteristics of the types 6 TN and 8 T storage batteries obtained by constant current and fixed resistance methods. Ribflex ribbon-wound, air-cooled resistors were used for the fixed resistance. load. Manually-adjusted carbon piles in parallel with the fixed resistors were used for the constant current load. AD 112128. DA R 3716.

Improvement of monochlorotrifluoroethylene insulated hook-up wire. Final report covering the period 1 Jun 1953-1 Jul 1955, under Contract DA 36-039-sc-52636, by Otto B. Lowe. Revere Corporation of America, Wallingford, Conn. Jul 1955. 137p photos, diagrs, graphs (part fold), tables (part fold). Order from LC. Mi $6.90, ph $21.30. PB 132853

This work shows that with proper control and selection of the basic polymer, and with adequate instrumentation and precise extrusion techniques, hook-up wire with the desired characteristics will be obtained. The improved extrusion technique herein described employs a "tubing" procedure rather than the true "extrusion" process. An additional objective of this development program, viz. the establishment of a short term testing procedure to be used during the extrusion process and which would accurately serve as a measure of the final wire performance, has not been fully realized. However, several quantitative short term tests and a qualitative procedure may be used in combination to reliably indicate the final wire performance after heat aging.

Industrial prepardness study on paper lined batteries, type BA-270/U-XPL. 17th quarterly progress report covering the period 1 Jun-31 Aug 1957, under Contract DA 36-039-sc-30226, by S.M. Wajnowski. Olin Mathieson Chemical Corporation. Research and Development Dept. Electrical Division, New Haven, Conn. Sep 1957. 12p table. Order from LC. Mi $2.40, ph $3.30. PB 132498

1. BA-270/U-XPL (Battery) 2. Batteries - Storage - Effect of climate 3. Batteries - Leakage 4. Batteries, Paper lined

Study, low-loss radio-frequency cable with improved high-temperature characteristics, by E.T. Pfund, Jr. and P.S. Klasky. United ElectroDynamics, Pasadena, Calif. Feb 1958. 102p photos, graphs, tables. Order from OTS. $2.50. PB 131842

Results of a search to obtain coaxial cables of 50-ohm characteristic impedance capable of sustained operation at a temperature of 300°C are described. The state-of-the-art of coaxial cable manufacture is revealed, and a firm basis for future development of radio-frequency cables with improved attenuation, high-temperature, and shielding effectiveness characteristics is provided. Electrical and environmental test results on six potentially high-temperature-resistant solid-sheathed coaxial cables are described. AD 151097. Project 4155, Task 41503 (formerly 41663). Contract AF 33(616)-3607. AF WADC TR 57-458.

FOOD AND KINDRED PRODUCTS

Development of accelerated storage tests for determining the stability of selected foods. Final report covering the period 2 May 1955-1 Nov 1956, under Contract DA 19-129-QM-353, by H. E. Newlin. Midwest Research Institute, Kansas City, Mo. Dec 1956. 52p graphs, tables. Order from LC. Mi $3.60, ph $9.30.
PB 132852

Dehydrated potato granules, Type I dehydrated eggs (yeast fermentation treatment), Type II dehydrated eggs (enzyme treatment) and round Class 3 crackers were stored at five accelerated temperatures, with 40° and 70°F reference temperatures, for periods of from 1 to 7 months. Samples were removed from storage at monthly intervals, rated for organoleptic quality, and analyzed for a series of values related to their freshness. Project 7-84-13-002C. MRI project 503-C-65. O-200, Report 7.

Effects of radiations on structure of fruits and vegetables. Final report under Contract DA 19-129-qm-328, covering period 1 Jun 1956-31 Aug 1956, by Z. I. Kertesz. Cornell University, Ithaca, N.Y. Sep 1956. 6p. Order from LC. Mi $1.80, ph $1.80. PB 133437

Model experiments have been made to establish the radiation susceptibility of pectin and wood and cotton cellulose and dry potato-starch. These tests provided background for an extensive experiment in which first the firmness of irradiated apple and carrot tissue was determined, and then the pectins and cellulose were isolated from the tissue samples. Pectin and cellulose degradation were followed by viscosity measurements. These investigations have established "threshold values" for the gamma radiation-induced tissue softening as well as for the degradation of pectin, cellulose, and starch. S 522, Report 6.

Physiological basis for various constituents in survival rations. Part IV: Integrative study of the all-purpose survival ration for temperate, cold and hot weather, by Frederick Sargent, II and Robert E. Johnson. Illinois. University, Urbana, Ill. Dec 1957. 23p graphs, tables. Order from OTS. 75 cents. PB 131709

The problem of an all-purpose survival ration suitable for the healthy young castaway in any environment from cold to hot has been solved by five years' intensive investigation. One and the same nutrient combination can and should be used for all environments, for any daily work loads from light to hard, and for any water supply from limited to abundant. Three separate studies simulating survival were required: temperate conditions, moderate work; winter cold, light and hard work; summer heat, light and hard work. A total of 8698 subject-days yielded results of statistical reliability. The quantitative characteristics of the all-purpose survival regimen were established by physiological, biochemical, nutritional, and clinical observations on the relative effects of water intake, total calorie intake, osmotic intake, ketosis, and ratio of protein, carbohydrate, and fat, for 20 different experimental regimens. AD 142233. Project 7156, Task 71805. For Pt. I see PB 128056, for Pt. III, vol. 1 see PB 131525. Contract AF 18(600)-80. AF WADC TR 53-484, Part 4.

Study of flavor and chemical changes in foods during sterilization by irradiation. Final report covering the period 13 May 1955-31 Aug 1956, under Contract DA 19-129-QM-413, by Robert E. Burks, Jr. Southern Research Institute, Birmingham, Ala. Oct 1956. 21p drawing, graph, tables. Order from LC. Mi $2.70, ph $4.80.
PB 132851

Beef irradiated with 2.5 and 4.0 megarep of gamma rays was examined to correlate chemical and flavor changes. The investigation was concerned with volatile bases, which were shown organoleptically to be important contributors to the characteristic unpleasant odor of irradiated beef. It was found, by use of the Conway-Byrne microdiffusion technique, that irradiated beef contained significantly more volatile bases than unirradiated beef. The volatile bases were isolated as solid hydrochlorides by a process involving lyophilization. The presence of amines in the bases was evident, from color reactions and odor, and the quantities of amines were estimated by colorimetric measurements employing ninhydrin and fluorodinitrobenzene. In order to make paper chromatography possible, the amine hydrochlorides were extracted preferentially from the mixed base hydrochlorides with isopropanol. Paper chromatography yielded evidence of six amines, two of which were identified as methylamine and ethylamine using five different sets of chromatographic conditions. Project 7-84-01-002. S-530, Report 10.

FUELS AND LUBRICANTS

Influence of hydrogen and deuterium on flame velocities of dry carbon monoxide-oxygen mixtures, by LeLand A. Watermeier. U.S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Feb 1957. 70p photos, diagrs, tables. Order from LC. Mi $3.90, ph $10.80.
PB 127348

A constant pressure method employing a schlieren photographic technique was used to determine the space velocities of dry carbon monoxide-oxygen mixtures with added hydrogen and deuterium. Flame velocities were obtained by using the data together with theoretical expansion ratios. The results are

presented and correlated with current diffusion and thermal theories. A simple mechanism is proposed for the combustion processes. Dept. of the Army project no. 5B0302001. ORD project no. TB 3-0110. APG BRL R 1004.

Laboratory evaluation of silane fluids as potential base stocks for hydraulic fluids and lubricants, by Harold W. Adams and George Baum. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, O. Mar 1958. 30p graphs, tables. Order from OTS. $1.00. PB 131889

The physical and chemical properties of the alkyl and alkyl-aryl silanes show them to possess good thermal stability up to 650°F, good lubricity and marginal oxidative stability at 500°F. An overall assessment of the properties of the silanes evaluated indicates that they are promising base materials for a 0 to 500°F engine oil or a 0 to 700°F hydraulic fluid. AD 142141. Project 7331, Task 73314. Covers work from Nov 1955 to Mar 1957. AF WADC TR 57-168.

Powdered-metal flames, by Joseph B. Conway and Aristid V. Grosse. Temple University. Research Institute, Philadelphia, Pa. Aug 1953. 77p photos, diagrs, graphs, tables. Order from LC. Mi $4.50, ph $12.30. PB 130865

Contents: I: Introduction. - II: Inflammability and explosibility of metal powders. - III: Thermodynamics of metal combustion. - IV. Production of powdered-metal flames. - A. Powdered-metal feed device. - B. Conveying of powders. - C. Torch design and operation. - D. Flame characteristics. - E. Melting ability. - F. Radiant effects. - G. High pressure operation. - V. Bibliography. AD 20972. High temperature project. Contract N9 onr-87301, Technical report no. 3.

Research on nitric acid-supported combustion. Quarterly progress report for period ending 15 Oct 1957, under Contract AF 49(638)-163, by G. Casaletto. North American Aviation. Rocketdyne Division, Canoga Park, Calif. Nov 1957. 10p photos. Order from LC. Mi $1.80, ph $1.80. PB 132897

The status of the current investigation into the combustion processes of nitric acid with various fuels is discussed. Descriptions and illustrations of the combustion system, including an acid metering and vaporizing system, a temperature equilibrator, a nozzle-type burner and accessory equipment are presented. R 665-2.

Research on the flammability characteristics of aircraft fuels and hydraulic fluids, by George S. Scott, Michael G. Zabetakis, Agnes C. Imhof, George W. Jones, Aldo L. Furno, and Frank W. Lang. U.S. Bureau of Mines, Pittsburgh, Pa. Explosives and Physical Sciences Division, Pittsburgh, Pa. Order separate parts described below as directed, giving PB number of each part ordered.

Supplement 1. May 1958. 29p graphs, tables. Order from OTS. $1.00. PB 131193s

The results of spontaneous ignition temperature tests conducted on JP-4 and seven hydraulic fluids in air while in contact with seven surfaces found in aircraft are presented. Tests were conducted at reduced and elevated pressures using both low and high velocity injection techniques. In addition, the flash and fire points of these fluids were determined in a standard ASTM apparatus. AD 155510. Project 3044, Task 73314. Covers work from 1 Nov 1956 to 31 Oct 1957. Supplement to PB 131193. AF WADC TR 57-151, Suppl. 1.

Supplement 2. Aug 1954. 44p diagrs, graphs, table. Order from LC. Mi $3.30, ph $7.80. PB 127339s2

The results of limit-of-flammability, limit-of ignitibility, limit-of-propagation and ignition temperature tests conducted on aircraft fuel and pure hydrocarbon vapor-air mixtures, with various quantities of added nitrogen and carbon dioxide, by the U.S. Bureau of Mines, Gas Explosions Branch between 1 February 1953 and 1 February 1954 are presented. Two aviation gasolines, three jet fuels and six pure hydrocarbon fuel components were used in the investigations. AD 47525. AF WADC TR 52-35, Suppl. 2. Contract AF 18(600)-151.

Supplement 4. Jan 1956. 98p photos, graphs, table. Order from LC. Mi $5.40, ph $15.30.

A summary of the theory of combustion, explosion and ignition is presented as well as the results of limit-of-flammability, limit-of-ignitibility, limit-of-propagation, ignition energy and ignition temperature tests on current Air Force fuels, fuel components and hydraulic fluids. These data were obtained by the members of the Bureau of Mines Gas Explosions Branch during the period February 1950 to June 1955. The data are presented in graphic and tabular form. AD 91875. Contract AF 18(600)-151. AF WADC TR 52-35, Suppl. 4.

Significance of quenching by ports in burning-velocity measurements by Bunsen-burner methods, by J. M. Singer, Joseph Grumer, and E. B. Cook. U.S. Bureau of Mines, Pittsburgh, Pa. 1956. 5p photos, Order from LC. Mi $1.80, ph $1.80. PB 132878

Technical report BUM-14-P. Paper to be submitted for publication to the Technical Notes Section of "Jet Propulsion" some time in 1956. 1. Burning rates 2. Bunsen burners - Flames 3. Flame -

Quenching, Thermal - Theory 5. Contract N6 ori-105, T.O. III, NR 098-038. Contract NA-onr-25-47, NR 098-117.

Turbulent flame theory derived from experiments, by Béla Karlovitz. U.S. Bureau of Mines. Pittsburgh, Pa. n.d. 17p photos, diagrs, graphs. Order from LC. Mi $2.40, ph $3.30. PB 132925

The structure of turbulent flames burning in explosive mixtures is described and illustrated by examples. A theory of turbulent burning velocity is developed, based on this flame structure. The cardinal point of this theory is the calculation of the time interval during which a small portion of the instantaneous combustion wave has statistical correlation with the random motion of a certain mass of gas. A comparison of measured values of the turbulent burning velocity with the predictions of this theory points to the possibility of turbulence generation by the turbulent flame. The mechanism is described by which the turbulent flame can generate additional turbulence and a theory of this process is developed, which permits the calculation of the intensity of flame-generated turbulence. A relationship is derived between the burning velocity, scale of turbulence, and the thickness of the turbulent flame brush. Measurement of the flame brush thickness by an electronic probe therefore gives information about the scale of turbulence in the flame. Summary in French. Date is 1953 or later. Reprinted as p. 248-262. Contract NAonr-25-47, NR 098-117.

HIGHWAYS AND BRIDGES

Effects of slow repetitional lateral loading on the passive resistance of sand, by Gregory P. Tschebotarioff. Princeton University. Dept. of Civil Engineering, Princeton, N.J. Dec 1956. 17p graphs. Order from LC. Mi $2.40, ph $3.30. PB 130690

The report gives the results of slow-repetitional lateral load tests performed at 1/4, at 1/2 and at 3/4 of the failure load of dense sand under static conditions. 12,000 to 32,000 load repetitions were performed at each test stage. The displacement-time diagrams permit the evaluation of factors of safety necessary for practical designs. Contract Nonr-1009(00), NR 081-117.

Mathematical expression of the CBR relations, by R.G. Ahlvin. U.S. Waterways Experiment Station, Vicksburg, Miss. Nov 1956. 12p table. Order from LC. Mi $2.40, ph $3.30. PB 126716

Mathematical developments leading to general equations which represent the pattern of present CBR relations for airfield pavement design in the range of CBR values below about 10 to 12 are presented. WES TR 3-441.

Soil solidification research. Minutes of conference held at Motion Picture Laboratory, Engineer Research and Development Laboratories, Fort Belvoir, Va., 27, 28 and 29 May 1952. U.S. Army. Corps of Engineers. Engineer Research and Development Laboratories, Fort Belvoir, Va. Jun 1952. 272p photos, diagrs, graphs. Order from LC. Mi $11.10, ph $42.60. PB 132457

Paul H. Symbol, Chairman. 1. Soil stabilization 2. Soils - Bonding agents 3. Soils - Chemical treatment 4. Soils - Compaction 5. Soils (Engineering)- Research

Statistical occurrence of soil strength, by S.J. Knight. U.S. Waterways Experiment Station, Vicksburg, Miss. Nov 1957. 8p photo, graph. Order from LC. Mi $1.80, ph $1.80. PB 132901

1. Soils - Trafficability 2. Soils - Moisture content - Measuring equipment 3. WES MP 4-238

Tables to calculate the electromagnetic field in the shadow region for various soils, by M.G. Belkina. Translated by Morris D. Friedman. Nov 1956. 126p graphs (part fold), tables. Order from LC. Mi $6.30, ph $19.80. PB 127450

AD 110298. Translated by Lincoln Laboratory, Massachusetts Institute of Technology, from a book in Russian published in 1949. 1. Fields, Electromagnetic - Tables - Russia 2. Terrestrial magnetism - Tables - Russia 3. Soils - Electromagnetic properties - Calculations - Russia

INSTRUMENTS

Analogue integrating system with numerical readout, by R.C. Leibowitz. U.S. Naval Powder Factory. Research and Development Dept., Indian Head, Md. Nov 1956. 23p diagrs, table. Order from LC. Mi $2.70, ph $4.80. PB 132458

The instrument described in this report has been designed to provide a measurement of the integral of transient waveforms. Evaluation of the instrument under laboratory conditions has indicated potential capabilities for practical application. NPF TR 94. NAVORD 5488.

Automatic recording cryoscope for determining the freezing point of milk, by C.W. Hiatt, Mathew Conrad, and E.S. Windham. U.S. Army. Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D.C. Aug 1956. 13p photos, diagrs, graph, table. Order from LC. Mi $2.40, ph $3.30.
PB 132899

An instrument was constructed to perform cryoscopic analyses of milk under precise automatic control. A permanent original record of each analysis is provided for use in referee analyses or court litigation. The ultimate precision of temperature measurement is $\pm 0.0006^{\circ}$C or less. Project 6-60-09-012, Subtask 23. WRAIR 138-56.

Automatic self-balancing capsule manometer, by F.G. Midwood and R.W. Hayward. Gt. Brit. Royal Aircraft Establishment, Farnborough, England. Jul 1955. 22p photos, diagrs (1 fold), graphs. Order from LC. Mi $2.70, ph $4.80.
PB 127050

This note contains a brief description of an automatic self-balancing capsule manometer which has been developed primarily for the measurement of pressures encountered in the operation of supersonic wind tunnels. A remote indicating system is employed which is suitable for use with digital recording and card punching apparatus. The instrument has been designed to cover a range of 0-2 atmospheres absolute and has been adjusted and calibrated to give an accuracy of 0.01 "Hg over the range 0.5" Hg to 60" Hg absolute. AD 83599. RAE TN Aero 2382.

Case study of the electronic-computer system at Farmers Insurance Group, by Paul Kircher. California. University. Management Sciences Research Project, Los Angeles, Calif. Feb 1957. 13p. Order from LC. Mi $2.40, ph $3.30.
PB 132545

This detailed report, on the experience of the Farmers Insurance Group with their IBM 705 computer, covers initial selection of equipment and personnel, preparation of programs, installation, and actual operation. The report should be of special interest because of the relatively low cost of the installation, together with the speed and efficiency with which the conversion was accomplished. The major conclusion of significance is that attention to long range and continuous systems planning, over a period of many years, has made a considerable contribution to the success of the electronic installation. Research report no. 52.

CNV spectrometer, a cold neutron vacuum spectrometer, by John J. Antal. U.S. Arsenal, Watertown, Mass. Materials Research Laboratory. Aug 1957. 66p photos, diagrs, graphs, tables. Order from LC. Mi $3.90, ph $10.80.
PB 132090

The cold neutron vacuum spectrometer described in this report was constructed and set up at the Brookhaven National Laboratory in conjunction with the Materials Research Laboratory, OMRO, program concerning the effect of radiation on solids. This crystal spectrometer was designed particularly for use in the long wavelength range (3.5A to 15A) and is capable of determining the transmission spectrum of specimens cooled to liquid nitrogen temperature. The design and operating characteristics of the spectrometer are evaluated. The report is written to serve also as a handbook for the instrument and thus includes much construction detail and all wiring diagrams. TB 4-911. DA 593-26-006. WAL MRL 31.

Computer components fellowship no. 347. Mellon Institute of Industrial Research, Pittsburgh, Pa. Order separate parts described below from LC, giving PB number of each part ordered.

Quarterly report no. 12, second series, for the period 1 Jul 1956-30 Sep 1956, under Contract AF 19(604)-943, by J.R. Bowman. Dec 1956. 57p drawing, diagrs, graphs, tables. Mi $3.60, ph $9.30.
PB 127216

Contents: I. Ceramic circuitry by screen process, by Martin N. Haller. - II. Circuitry by vacuum evaporation and deposition, by Robert L. Serenka and Samuel R. Weatherford. - III. Stannic oxide resistors, by Roland L. Wick. - IV. Voltage dependence of brightness wave characteristics of electroluminescent cells having various metal electrodes, by J.J. Mazenko. AD 98802. For 1st-10th reports, second series, see PB 114377, 114976, 115560, 117013, 117590, 117776, 118861, 122361, 124507 and 123673. AF CRC TN 56-597.

Quarterly report no. 3, 3rd series covering the period 1 Apr-30 Jun 1957 under Contract AF 19(604)-1959. High temperature printed circuitry, by M.N. Haller, R.L. Serenka, J.J. Mazenko, L. Chase, and J. Lesko. Jul 1957. 32p photos, diagrs, graphs, tables. Mi $3.00, ph $6.30.
PB 132125

The purpose of this project is to evaluate the screen process as a means of producing high temperature printed circuits. Enamel resistance films of bismuth fluxed and of glass fluxed gold have been tested at 25°-500°C. TiO_2 added to glass enamels has been tested. Vacuum evaporated gold-palladium film resistors were tested at sub-zero. High temperature soldering is discussed. Individual heating ovens used for testing are described. AD 133648. AF CRC TN 57-596.

Design, construction and operation of the Princeton 4 by 8 inch variable-density supersonic tunnel. Technical report no. 34, under Contract N6ori-105, by Seymour M. Bogdonoff. Oct 1951.

38p photos, diagrs, graphs. Order from OTS. $1.00. PB 131883

The design, construction, and operation of the Princeton 4 by 8-inch Variable Density Supersonic Tunnel are described in some detail. The tunnel has been designed for a range of Mach numbers from 1.5 to 5.0 and has operated on a Reynolds number range from less than 1 x 10^6 up to 60 x 10^6. Model mounting and tunnel starting problems are discussed and the present research program now under way is outlined. Contract N6ori-105, T.O. 3, NR 220-038. Project Squid. PU TR 34.

Development of a gear and spline lubricant tester, by John Morris, Joseph Goldworthy, John Scott, and Charles Sauter. Western Gear Works, Lynwood, Calif. Oct 1954. 92p diagrs, graph, table. Order from LC. Mi $5.40, ph $15.30. PB 132284

Design of a gear and spline lubricant tester which will accommodate, as test specimens, all the most popularly used types of gears; such as, spur, helical, worm, straight bevel, spiral bevel, and hypoid, as well as splines, is described. The lubricant tester will be capable of test gear speeds up to 30,000 RPM and tooth loads up to 6000 pounds per inch of face width. The design of the tester was based on the analysis of information from sources listed in the bibliography, gear lubrication experience, and preliminary design studies of possible new simulation, as well as gear type testers. AD 52497. Proj 3044, Task 73312. Contract AF 33 (616)-496. AF WADC TR 54-37.

Electromechanical plotting board 4 foot by 4 foot, by H.G. Paine. U.S. Naval Research Laboratory. Nov 1957. 12p photos, graph, table. Order from LC. Mi $2.40, ph $3.30. PB 132877

Two 4-ft by 4-ft electromechanical tactical plotting boards were developed by NRL for the Bureau of Ships. A record is given herein of the outstanding features of these boards and of the data compiled during this work. The completed boards showed remarkable stability, excellent settling characteristics, and relatively fast movement for boards of this size driven by 10-w motors. It was found that the board's capability was 51 plots/min for fixed-cycle plotting and approximately double this figure for null-sense sequence plotting. NRL R 5032.

Feasibility of a graphite-carbon dioxide ionization chamber to measure carbon dose at high dose rates, by Robert L. Hickmott. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, O. Dec 1957. 31p. Order from OTS. $1.00. PB 131671

This report discusses the feasibility of designing a graphite-carbon dioxide ion chamber for the absolute measurement of the carbon dose rate from a pure gamma field up to 10^{10} erg/g/hr. There is insufficient data on neutron response to judge the feasibility of using the ion chamber in mixed fields with large neutron components. AD 142249. Project 6002, Task 73075. Covers work from Apr-Nov 1957. AF WADC TN 57-335.

Four-channel noise source, by George H. Barnes. Franklin Institute. Laboratories for Research and Development, Philadelphia, Pa. Apr 1955. 17p photo, diagrs. Order from LC. Mi $2.40, ph $3.30. PB 132255

A low-frequency four-channel noise source has been constructed for use in human response studies. This device is useful in determining frequency response characteristics for jet pilots. The amplitude on each channel is variable from zero to one-quarter volt rms, and the bandwidth is variable from 0.08 cps to 0.64 cps in four discrete steps. Project 7182, Task 71510. Contract AF 33(038)-10420. AF WADC TR 55-194.

Luminescent gas flow visualization in a low-density supersonic wind tunnel, by W.B. Kunkel and F.C. Hurlbut. California. University. Institute of Engineering Research, Berkeley, Calif. Sep 1957. 62p photos, diagrs, table. Order from OTS. $1.75. PB 131766

New afterglow flow visualization apparatus has been installed as a facility of the University of California low density wind tunnel. The use of this equipment in the visualization of low density flows of various gases is described. Afterglows and afterglow mechanisms in nitrogen, air, argon and helium are discussed. On the basis of tests with the new apparatus the range of practicability of the enriched air glow technique was found to extend from Mach 2 to Mach 4. The argon and helium glows were found to be useful in the range Mach 1.3 to Mach 2. Discussion of the ranges of applicability and of other aspects of the observed glows is supported by representative glow photographs. AD 151007. Project 1063, Task 70124. Covers work from 1950-1956. Contract AF 33(616)-2852. AF WADC TR 57-441.

Measurement of hydrophone voltage coupling loss, by Robert J. Bobber. U.S. Underwater Sound Reference Laboratory, Orlando, Fla. Dec 1956. 16p diagrs, tables. Order from LC. Mi $2.40, ph $3.30. PB 132476

The measurement of hydrophone voltage coupling loss is susceptible to errors because of the effects of improper circuitry, grounding conditions, and the finite impedances of the cable conductors. This report analyzes and explains these effects, and, where possible, shows methods for eliminating the effects or the errors due to them. USRL RR 40.

New thermal conductivity leak detector and its applications, by Clarke C. Minter. U.S. Naval Research Laboratory. May 1958. 7p diagrs, tables. Order from OTS. 50 cents. PB 131774

This report points out the reasons for the failure of the Pirani tube as a sensitive leak detector and describes a simple thermal conductivity apparatus of special design having several advantages over the mass spectrometer so widely used for this purpose. Procedures are described for using the new apparatus to locate leaks in vacuum or pressure systems using hydrogen or helium as probe gas. Experiments to determine the sensitivity of the apparatus toward small changes in concentration of Freon in air are described, and it has been concluded that leaks in refrigeration equipment can be located even when appreciable concentrations of Freon are present in the ambient air. NRL R 5150.

Power spectrum computer, by H. W. Smith, R. M. McClure, and F. X. Bostick, Jr. Texas. University. Electrical Engineering Research Laboratory, Austin, Tex. Nov 1956. 46p photos, diagrs, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 130787

This report covers the design and operation of a power spectrum computer for the range of frequencies from 1 to 100 cycles per second. Included are photographs, block and circuit diagrams, and a mathematical treatment of the problem. Contract Nonr-375(01), NR 371-023. TU EERL 86.

Pressurized Karl Fischer apparatus, by Aaron N. Fletcher and Raymond H. Pierson. U.S. Naval Ordnance Test Station, China Lake, Calif. Jun 1956. 17p photo, drawings, diagrs, tables. Order from OTS. 50 cents. PB 131501

A pressurized Karl Fischer apparatus was designed and built for general purpose usage. The equipment was designed to prevent the interchange of moisture between the reaction cell and the atmosphere while titrating and when introducing liquid or solid samples and to provide stable storage conditions for the reagents. AD 103678. Covers work from Mar 1955-Jun 1956. NOTS 1495. NAVORD 5277.

Radio direction finder bearing computers. Summary technical report under Contract Nonr-1834 (02), NR 371-161, by A. D. Bailey, D. L. Bitzer, R. L. Sydnor, and others. Illinois. Engineering Experiment Station. Electrical Engineering Research Laboratory, Urbana, Ill. Jul 1956. 35p diagrs, graphs. Order from LC. Mi $3.00, ph $6.30. PB 127466

Sixteen systems are proposed for sector-type and omnidirectional-type analog bearing computers for use with small aperture radio direction finders. Certain of the systems have been realized in the laboratory. Others remain in the paper stage, either because of the relative complexity, or non-immediate application. Several of the analog systems yield data in a form that is ready for immediate processing by digital computers that function in real time. Contract Nonr-1834(02), NR 371-161, Technical report no. 2.

Regenerative heat exchanger with heat-loss consideration, by E. K. Dabora. Michigan. University, Engineering Research Institute, Ann Arbor, Mich. Aug 1957. 25p graphs. Order from LC. Mi $2.70, ph $4.80. PB 132132

Contract AF 18(600)-1199 calls for an investigation of the possibility of achieving a standing detonation wave. For this study, two regenerative heat exchangers of the pebble type have been designed and built. The excessive heat loss in the smaller one necessitated a closer study of its effect on this type of heat exchange. Hence the analysis in this report came about. AD 136603. Contract AF 18 (600)-1199. MU ERI Proj 2284-14-T. AF OSR TN 57-613.

Research and development of cathode ray type pressure time recorder. Final summary report for the period 9 Jun 1955-9 Jun 1956, under Contract no. DA 36-034-ORD-2033, by H. W. Halvorsen and W. C. Green. National Scientific Laboratories, Inc., Washington, D.C. Jun 1956. 15p fold. diagr. Order from LC. Mi $2.40, ph $3.30. PB 127145

The development of a portable pressure time recorder is described. Printed records of transient high pressure phenomena are furnished within 60 seconds by the instrument. The input circuit is designed to work directly from 1000 ohm differential strain gage transducers. The pressure range is determined by selection of a transducer of suitable characteristics Eight ranges of time are available between 1 and 128 milliseconds. Calibration of pressure and time are automatically performed within the instrument and are recorded as part of the permanent record. The components of the instrument are a special purpose 5" cathode ray oscilloscope, a suitable recording camera and acessories.

Research on a method for converting shaft position data to binary digital information, by Robert Z. Geller. Farrand Optical Company, Inc., New York, N.Y. Jul 1957. 28p photo, diagrs. Order from OTS. 75 cents. PB 131827

The design of the inductive device is based on a previous development by the same company under Contract AF 33(038)-5135. The theory of operation of the pulse converter is discussed, and operating characteristics are considered in relation to the present state of development of analog-to-digital conversion. Several examples are presented demonstrating the application of the pulse device. AD 151071. Contract AF 33(616)-3012. AF WADC TR 57-275.

Research on analog-digital converter. Part 2, Phase 2, by Robert Z. Geller. Farrand Optical Company, Inc., New York, N.Y. Mar 1957. 38p photo, diagrs, graph, tables. Order from LC. M $3.00, ph $6.30. PB 132276

The Microsolver is a precision resolver. Rotor and starter patterns are based upon general design principles of the Inductosyn, a high-accuracy micro-positioning device developed by the same Company under the same sponsorship. Results of tests conducted on an experimental Microsolver reveal that a coupling error as low as 0.06% of the maximum coupling voltage over 360 degrees shaft rotation has been achieved in this first model. Analysis of test data suggests that with further development of the Microsolver, this error can be reduced to 0.01% and an advance in the present state of the art can be achieved. AD 118286. Contract AF 33 (616)-380. AF WADC TR 55-279, Part 2.

Review of the cone-to-rod efficiency ratio as a specification for lighting systems, by John Lott Brown. Columbia University, New York, N.Y. Aug 1957. 27p graphs. Order from OTS. 75 cents. PB 131704

The need for systems of illumination which will afford the maximum stimulation of the eye at low luminances has led to the widespread use of red light. The theoretical basis for the advantage of red light is reviewed. Several methods for the practical specification of illumination which are based on a cone-to-rod luminous efficiency ratio are considered. These methods are analyzed and compared in terms of the actual physical significance of the numerical values which they yield. The general problem of specification is discussed in relation to a number of the underlying practical problems, such as luminance level at which a given illumination system must be used, the nature of the visual tasks for which it is provided, and the nature of the visual tasks for which sensitivity must be preserved. It is concluded that a cone-to-rod luminous efficiency ration may afford a satisfactory index for the specification of lighting systems. AD 130927. Project 7186, Task 71544. Contract AF 33(038)-22616. AF WADC TR 57-448.

Study of the characteristics of foam-water sprinkler systems in controlling full-scale fires, by E.J. Jablonski, H.B. Peterson, and R.L. Tuve. U.S. Naval Research Laboratory. Jun 1958. 47p photos, diagrs, graphs, tables (part fold). Order from OTS. $1.25. PB 131740

The recent development of a new type of sprinkler head designed for fire hazards involving flammable liquids (class "B" fires) has made it possible to improve fire protection in the hanger deck spaces aboard aircraft carriers. This head is a combination foam and water nozzle which delivers a spray pattern of foam when supplied with a 6-percent foam solution. In the absence of foam solution, it performs as a normal water sprinkler head. Fire tests employing a 349-sq-ft area of JP-4 fuel within a structure of 1150-sq-ft floor area were conducted to compare the effectiveness of the foam-water sprinkler and the conventional water sprinkler heads presently installed in hanger decks. The effect of varying the height of the head above the deck, operating pressure, and rate of application were studied in relation to the foam's physical properties and fire extinguishing ability. NRL R 5139.

Study of the use of a cooled probe for sampling hot combustion gas by means for determining heat release, by P.E. Erbe, J.T. Grey, and J.L. Beal. Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y. Sep 1948. 14p drawings, graph, tables. Order from LC. Mi $2.40, ph $3.30. PB 132927

The most serious practical question concerning the determination of energy release by sampling and gas analysis concerns the rate of cooling necessary in order to "freeze" the CO and H_2 at the values they have in the combustion chamber and how this rate can be achieved with practical sampling equipment. A study of these questions has been undertaken and is here reported. Project Squid. Contract N6 ori-119, NR 220-041. CAL TM 8. CAL DD-420-A-9.

Theoretical analysis of a new type of heater for an intermittent hypersonic wind tunnel, by Antonio Ferri, Paul A. Libby, and Victor Zakkay. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Aeronautical Research Laboratory, Dayton, O. Jul 1957. 49p diagrs, graphs. Order from OTS. $1.25. PB 131591

Following a brief discussion of the need for high stagnation temperature and pressures for wind tunnels with test Mach numbers of more than five and of the limitations of conventional heaters, a new type of heater suitable for use with an intermittent hypersonic wind tunnel is proposed. An analysis of this compression heater under ideal, that is zero heat transfer, conditions is presented with a view to establishing the characteristics required for its uses with an intermittent hypersonic wind tunnel. The problem of heat transfer from the compressed high temperature air to the walls of the heater during tunnel operation is discussed; it is indicated how the use of a porous liner with cold air injection can sufficiently reduce this heat transfer so that the idealized heater characteristics can be practically realized. AD 130911. Project 1363, Task 70129. This report, prepared Jul 1952, was given limited distribution as PIBAL report 201. Contract AF 33(616)-17. AF WADC TN 57-264.

MACHINERY

Bimetallic brake drum test, by Alex M. Calaluca. U.S. Arsenal, Detroit. Laboratories Division. Mechanical Laboratory, Center Line, Mich. Mar 1957. 29p photos, graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 132810

The object was to perform a preliminary investigation of bimetallic brake drum Code "X" by determining brake lining frictional characteristics, drum expansion and rate of heat dissipation. Ordnance project TT1-649. DA R 3852.

Calculation of developed pressure and fluid power in linear polyphase induction liquid metal pumps, by R.S. Baker. Mine Safety Appliances Company, Callery, Pa. Mar 1956. 68p photos, drawings, diagrs, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 132109

Part 1 pertains to factors which affect the performance of linear polyphase induction liquid metal pumps. These factors are: frequency of the power source, speed of the traveling field, electrical power losses due to harmonic losses of the traveling magnetic field, and "end effects" due to the stationary fields at each end of the pump. Formulas are given for calculating the pressure developed in liquid metal, by the action of a traveling magnetic field in a linear polyphase induction pump, and the electrical power loss in the liquid metal caused by the traveling field. Part 2 gives the relationships for obtaining maximum shut-off pressure by varying pump dimensions. An illustrative example of the application of these relationships is included. Contract NObs 65426, Technical report 48.

Construction of a high temperature, high gradient furnace, by R.C. Hall. Westinghouse Electric Corporation, East Pittsburgh, Pa. Feb 1955. 16p photo, drawing, graphs. Order from LC. Mi $2.40, ph $3.30. PB 132282

For the growth of single crystals in sheet material of iron and iron alloys by the strain-anneal method it was necessary to construct a high temperature, high gradient furnace. A design based on passing a specimen through a water-cooled copper block into a zone heated by a resistance wound tube met the specifications. Initial tests indicate that this furnace design can be made to yield good experimental results. Project 7080, Task 70651. Contract AF 33(616)-309. AF WADC TN 55-10.

Investigation of disturbances due to oil films in journal bearings, by Burt L. NewKirk and John F. Lewis. Rensselaer Polytechnic Institute, Troy, N.Y. Dec 1954. 54p photos, diagrs, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 130929

The purpose of this investigation is to study the instability characteristics of journal bearings, and to determine design criteria which extend the stable operation in super-critical speeds. Significant parameters of the journal bearing which were varied in the experimental program included bearing length, bearing clearances, unit bearing loads, and viscosity of the lubricant. It is concluded that short bearings, comparatively large clearance ratios, and moderate unit bearing loads extend the limiting speeds of stable operation to higher super-critical values. AD 74142. Project no. 3066, Task no. 70503. Contract AF 33(038)-204(83). AF WADC TR 54-188.

Investigation of spades for recovery vehicles, by S.J. Weiss, L. Abarca, and W. Harrison. U.S. Ordnance Corps. Research and Development Division. Land Locomotion Research Branch. Jan 1957. 31p photos, diagrs, graphs. Order from LC. Mi $3.00, ph $6.30. PB 126895

An application of available theoretical methods to the evaluation of spade action in soil was found practical and may save time and money in design evaluation of various recovery vehicle and gun spade arrangements. The method has led to the proposal of a redesign of spade arrangement for the M51 recovery vehicle. This would increase the winch pull of the vehicle from approximately 25 to 50% as confirmed experimentally in sandy soils. ORD OOR TM M-03.

Miniaturized dynamotors. Final report for the period 15 May 1954-15 May 1956, under Contract DA 36-039-sc-56768, by R.F. Williams, G.P. Scher, and R. Olsen. Electric Engineering Products Co., Inc., Chicago, Ill. Jun 1956. 134p photos, drawings, diagrs, graphs, tables. Order from LC. Mi $6.90, ph $21.30. PB 127475

The purpose of this contract is to conduct investigations leading to the development of miniaturized dynamotors, and to supply information for prototypes of a miniaturized dynamotor.

MATHEMATICS AND STATISTICAL ANALYSIS

Algebraic topological approach to Kron's method. Part I, by J. Paul Roth. Princeton University. Institute for Advanced Study. Electronic Computer Project, Princeton, N.J. Jun 1956. 43p diagrs, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 126892

It is well known that an important class of problems in numerical analysis can be interpreted as "electrical" network problems. These analogues have formed the basis of many analogue and digital methods of solution of certain partial and ordinary differ-

ential equations. This report considers not the problem of devising topological models for physical problems, but the network problem per se, and begins with a resume of its history. Dept. of the Army project no. TB 3-0538. Material in this report has been presented in lectures at the University of California in Berkeley and Los Angeles, Princeton University, University of Pennsylvania and General Electric Co. in Schenectady in the years, 1954-6. Contract DA-36-034-ord-1646. Contract Nonr-1358, NR 044-047. PU IAS 7 ... 03.

Approximate integration of ordinary differential equations by means of Laplace Transformation, by Wolfgang Wasow. Polytechnic Institute of Brooklyn. Microwave Research Institute, Brooklyn, N.Y. Jun 1956. 20p. Order from LC. Mi $2.40, ph $3.30. PB 126858

In a paper in the Proceedings of the IRE, vol. 44, p. 89-101 (1956), R. Boxer and S. Thaler propose a method for the computation of inverse Laplace transforms which has interesting applications to the numerical solution of linear and nonlinear differential equations. The first purpose of this paper is to give a mathematically complete proof for this method. This is done by means of arguments that differ considerably from those of Boxer and Thaler. Contract Nonr-839(05), NR 375-216. PIB 434. PIB R 504-56.

Approximation of all orders of the exponential integral, by Francis Clark. TRG, Incorporated. Mar 1958. 15p tables. Order from OTS. 50 cents. PB 131810

AD 151084. Project 2134, Task 73070. Covers work from 1 Apr-31 Dec 1957 under Contract AF 33(616)-5187. 1. Equations, Integral 2. Mathematical functions 3. Approximate computations 4. AF WADC TR 57-771

Asymptotic factorization of ordinary linear differential operators containing a large parameter, by A. Erdélyi. California Institute of Technology. Dept. of Mathematics, Pasadena, Calif. Jan 1956. 29p. Order from LC. Mi $2.70, ph $4.80. PB 126777

This report studies the asymptotic factorization of ordinary linear differential operators, to obtain a new proof and an extension of Langer's theorem. Contract Nonr-220(11), NR 043-121, Technical report no. 8.

Contributions to the theory of rank order statistics: The "Trend" case, by I. Richard Savage. Stanford University. Dept. of Statistics, Stanford, Calif. Aug 1956. 18p table. Order from LC. Mi $2.40, ph $3.30. PB 128121

1. Statistical theory 2. Contract Nonr-225(21), NR 042-993 3. SU DS TR 5

The crack-extension-force for a crack at a free surface boundary, by G.R. Irwin. U.S. Naval Research Laboratory. Apr 1958. 11p diagrs. Order from LC. Mi $2.40, ph $3.30. PB 130316

In previous work it has been assumed the stress-intensity-factor $\mathcal{K}$ from two dimensional elastic theory analysis for an edge crack in tension is the same as that for a double length completely embedded crack. The influence of the side boundary free surface upon stresses near an edge crack in tension was studied and evaluated. To an accuracy of several percent the stress-intensity-factor $\mathcal{K}$ for an edge crack of length, a, is ten percent larger than the $\mathcal{K}$ value, $\sigma\sqrt{\pi a}$, which pertains to an embedded crack of length $2a$ subjected to a normal tensile stress σ. NRL R 5120.

Critique on the analytical representation of specific heat data, by Richard Pawel. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, O. Nov 1957. 21p graphs. Order from OTS. 75 cents. PB 131552

A considerable lack of agreement exists in the literature for high temperature specific heat values. Since the majority of these data have been obtained indirectly through enthalpy measurements, the problem of data treatment is added to those of the experiment. It is thought that the present uncertainties in the methods of curve fitting the enthalpy data can yield misleading trends to the resulting specific heat curves. The final result is considered in the light of simple specific heat theory and the accuracy and reproducibility of the original enthalpy data. AD 142095. Project 7360, Task 73603. Covers work from Jan-Aug 1957. AF WADC TN 57-308.

Cylindrical shells under line load, by R.M. Cooper. Michigan. University. Engineering Research Institute, Ann Arbor, Mich. Jun 1956. 15p diagr, graph, table. Order from LC. Mi $2.40, ph $3.30. PB 127422

The problem of a line load along a segment of a generator of a simply supported cylindrical shell is treated using shallow cylindrical shell equations which include the effect of transverse shear deformation. The line load is first treated as a sinusoidally-varying edge load over the length of the shell, with boundary conditions prescribed along the loaded generator such that the continuity of the shell is maintained. The solution for the problem of a uniform line load over a segment of a generator is obtained from the preceding solution, using the principle of superposition. By means of a numerical example it is shown that the results predicted by the Donnell equations for the stresses are in excellent agreement with those obtained from the system of equations employed here. However, the radial displacement predicted by the Donnell equations is in error by as much as 20%. Contract Nonr-1224(01), NR 064-408. Technical report 7. MU ERI Proj 2150-7-T.

Determination of parameters of a functional relation by factor analysis, by Ledyard R. Tucker. Princeton University. Dept. of Psychology, Princeton, N.J. Apr 1955. 11p graph. Order from LC. Mi $2.40, ph $3.30. PB 127020

Consideration is given to determination of parameters of a functional relation between variables by the means of factor analysis techniques. These solutions may represent important results from experimental investigations. National Science Foundation grant NSF-G-642. Contract N6 onr-270-20, NR 150-088.

Differential equations involving a parametric function, by R.H. Cameron. Minnesota. University, Minneapolis, Minn. n.d. 11p. Order from LC. Mi $2.40, ph $3.30. PB 126825

1. Equations, Differential 2. Mathematical equations and solutions 3. Wiener integrals

Experimental measurement of utility by use of a linear programming model, by Donald Davidson and Patrick Suppes. Stanford University. Applied Mathematics and Statistics Laboratory, Stanford, Calif. Apr 1956. 31p graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 126715

The purpose of this paper is to report an experiment which was designed to measure the cardinal utility of non-monetary outcomes and to use the utilities to predict further choices. The basic experimental design follows that of previous experimental work by Davidson, Siegel and Suppes (PB 123223). Contract Nonr-225(17), NR 171-034, Technical report no. 3.

Extreme value properties of Hermitian matrices, by M. Marcus and B.N. Moyls. University of British Columbia. Dept. of Mathematics, Vancouver, B.C., Canada. Aug 1956. 33p. Order from LC. Mi $3.00, ph $6.30. PB 126897

Discusses extreme value properties of Hermitian matrices, and two related problems to determine the algebraic structure of a set of o.h. vectors which minimize or maximize $f(x_1, \cdots, x_k)$ and to determine these extreme values. AD 95217. Contract AF 18(603)-83. AF OSR TN 56-341.

Functional Pontrjagin cohomology operations, by Emery Thomas. California. University. Dept. of Mathematics, Berkeley, Calif. Oct 1957. 13p. Order from LC. Mi $2.40, ph $3.30. PB 132981

1. Mathematical functions 2. Contract 49(638)-79 3. AF OSR TN 57-793

Hurwicz's optimality criterion for decision-making under ignorance, by Kenneth J. Arrow. Stanford University. Dept. of Economics, Stanford, Calif. Feb 1953. 21p. Order from LC. Mi $2.70, ph $4.80. PB 126823

Hurwicz has presented an axiomatic approach to the problem of choice of an action from a given set when the consequences of any action are functions of an unknown state of nature. The present note aims to simplify the proof of Hurwicz's theorem and omit some unnecessary restrictions. Contract N6 onr-251(33), NR 047-004. SU DE TR 6.

Kinetic theory and statistical mechanics, by Harold Grad. New York University. Institute for Mathematics and Mechanics, New York, N.Y. Feb 1950. 290p diagrs. Order from LC. Mi $11.10, ph $44.10. PB 132467

An attempt is made to give a unified approach applicable to all phases of kinetic theory and statistical mechanics. The probability assemblage of conceptual replicas of the system introduced by Gibbs is taken as the basis of a continuum treatment of molecular matter. A critical account is given of the elementary results obtainable through the concept of the mean free path. Elementary treatment of statistical mechanics is based on the method of the most probable distribution. An attempt is also made to clarify the reason for the introduction of microcanonical and canonical distributions. A systematic discussion of integrals more general than the energy is given in connection with ergodic hypotheses. The nonequilibrium theory of a perfect gas is approached by means of the Boltzmann equation. ATI 72856. Contract N6 ori-201, T.O. 1.

Meta-rheology, by Michael Sadowsky. Rensselaer Polytechnic Institute. Dept. of Mechanics, Troy, N.Y. Aug 1955. 28p. Order from LC. Mi $2.70, ph $4.80. PB 127023

A theoretical approach to matter and space. Attempts to prove mathematically that a body with an intrinsic kinematic constraint of a given equation, treated as a mechanism (no energy storage and no energy dissipation) is the carrier of a Maxwellian electrostatic stress field. AD 70657. Contract Nonr-591(02), NR 064-405, Technical report no. 10.

Miami University report no. 9. Part I: Continuity postulate for Markov processes, abstract space case, D.G. Austin and R.V. Chacon. Part II: Kolmogorov differential equations, by D.G. Austin. Miami University, Coral Gables, Fla. Sep 1957. 54p. Order from LC. Mi $3.60, ph $9.30. PB 132970

AD 136575. Report 9. 1. Markoff process 2. Equations, Differential 3. Contract AF 49(638)-184 4. AF OSR TN 57-587

Modified randomization tests for non-parametric hypotheses, by Meyer Dwass. Stanford University. Dept. of Statistics, Stanford, Calif. May 1956. 14p table. Order from LC. Mi $2.40, ph $3.30. PB 128710

1. Random functions 2. Statistical theory 3. Contract Nonr-225(21), NR 042-993 4. SU DS TR 3

Normalized nomogram for the "wye-delta" transformation, by K. M. Chapman. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, O. Dec 1957. 10p diagr. Order from OTS. 50 cents. PB 131697

The nomogram described here performs the transformations between the "wye" and "delta" forms of three-terminal networks. While the coordinates are normalized with respect to the smallest "wye" element, an operating procedure is described which is only slightly more complicated than using an ordinary slide rule. It will handle any three-terminal network whose elements can be represented simultaneously as positive real numbers. In general, it cannot be applied to complex impedances. The range of the nomogram includes networks having as much as a 100:1 ratio between the largest and smallest "wye" elements. AD 142098. Project 7216, Task 71712. AF WADC TN 57-372.

Note on non-stable cohomology operations, by Franklin Peterson and Emery Thomas. California. University. Dept. of Mathematics, Berkeley, Calif. Oct 1957. 13p. Order from LC. Mi $2.40, ph $3.30. PB 132975

AD 136717. 1. Mathematical functions 2. Contract AF 49(638)-79 3. AF OSR TN 57-695

Number of lattice points in an n-dimensional tetrahedron, by S. Chowla and W. E. Mientka. Colorado. University, Boulder, Colo. Feb 1955. 7p. Order from LC. Mi $1.80, ph $1.80. PB 129485

AD 100907. Project R-354-10-41. CU Report C-10. 1. Polynomials 2. Tetrahedrons - Structure 3. Contract AF 18(600)-758 4. AF OSR TN 55-60

Numerical solution of singular integral equations, by Richard C. MacCamy. Carnegie Institute of Technology. Dept. of Mathematics, Pittsburgh, Pa. Sep 1957. 23p. Order from LC. Mi $2.70, ph $4.80. PB 132137

AD 136500. 1. Equations, Integral 2. Contract AF 18(600)-1138, Technical report no. 19 3. AF OSR TN 57-515

On a method for the construction of fundamental solutions in elasticity theory, by Bruno A. Boley and Anthony D. Barber. Columbia. University. Institute of Flight Structures. Dept. of Civil Engineering and Engineering Mechanics, New York, N.Y. Jul 1956. 18p graphs. Order from LC. Mi $2.40, ph $3.30. PB 127406

A technique is described for the construction of displacement functions corresponding to prescribed conditions at the surface of a solid of arbitrary shape, and exhibiting a prescribed type of singularity at a point in the interior of the solid. These functions are found to satisfy certain integral equations; a series solution and an iterative method of solution of the latter are described. As an illustration, the problem of a force in the interior of a semi-infinite solid is discussed. CU -7-56-ONR-266(20)CE. Contract Nonr-266(20), Technical report no. 7.

On finite expansion of a hole in a thin infinite plate, by P. G. Hodge, Jr. and R. Sankaranarayanan. Polytechnic Institute of Brooklyn. Dept. of Aeronautical Engineering and Applied Mechanics, Brooklyn, N.Y. Jan 1957. 17p diagrs, graphs. Order from LC. Mi $2.40, ph $3.30. PB 132445

A complete solution for all values of applied pressure is obtained for the expansion of a hole of zero radius in an initally uniform infinite sheet. The analysis is compared with those of previous investigators and found to be simpler and/or more complete. It is shown that the results are applicable to the expansion of a finite hole in a uniform sheet and to the expansion of a hole in a tapered sheet. Contract Nonr-839(11), NR 064-416. PIB AL 367.

On infinitely divisible random vectors, by Meyer Dwass and Henry Teicher. Stanford University. Dept. of Statistics, Stanford, Calif. May 1956. 21p. Order from LC. Mi $2.70, ph $4.80. PB 126826

A normally distributed random vector X is well known to be representable by A.Y (In the sense of having identical distributions) where A is a matrix of constants and Y is a random vector whose component random variables are independent. A necessary and sufficient condition for any infinitely divisible random vector to be so representable is given. The limiting case is discussed as are connections with multivariate Poisson distribution and stochastic processes. Contract Nonr-225(21), NR 042-993. SU DS TR 4.

On Markoff chains, by Shu-Teh Chen Moy. Wayne University, Detroit, Mich. Oct 1957. 26p. Order from LC. Mi $2.70, ph $4.80. PB 132895

1. Random distribution - Theory 2. Contract DA 20-018-ord-14025, Technical report 3

On stability in the large for periodic solutions of differential systems, by George Seifert. Iowa State College of Agriculture and Mechanic Arts, Ames, Iowa. Mar 1957. 9p. Order from LC. Mi $1.80, ph $1.80. PB 126885

AD 120436. 1. Mathematical equations and solutions 2. Equations, Differential 3. Contract AF 18(603)-51 4. AF OSR TN 57-88

On the analogy between plates and discs, by William Prager. Brown University. Division of Applied Mathematics, Providence, R.I. Aug 1956. 8p. Order from LC. Mi $1.80, ph $1.80. PB 127045

The well-known analogy between elastic plates and discs of uniform thickness is extended to inelastic plates and discs of varying thickness. Ordnance proj. TB 3-0122. D/A project 503-06-005. Contract DA 19-020-ORD-798. GDAM DA 798/28. BU AM TR 28. APG BRL TR 28.

On the existence of solutions to the equations of general equilibrium under conditions of perfect competition, by Kenneth J. Arrow. Stanford University. Dept. of Economics, Stanford, Calif. Dec 1951. 25p. Order from LC. Mi $2.70, ph $4.80. PB 126822

Modern economic theory describes an existing situation as the solution of a set of non-linear simultaneous equations arising from the utility-maximizing behavior of consumers, the profit-maximizing behavior of procedures, and the tendency of the market to enforce an equality between supply and demand. The existence of solutions to this system of equations has been investigated by A. Wald in some special cases; a more general treatment is given here. It is shown that a solution exists whenever the set transformation possibilities for each firm is a closed convex set, non-increasing returns to scale prevail, and the utility functions of individuals possess certain regularity properties. Contract N6onr-251(33), NR 047-004. SU DE TR 3.

On the graphs and asymptotic forms of finite relation matrices and stochastic matrices, by David Rosenblatt. American University. Dept. of Statistics, Washington, D.C. Jun 1956. 35p. Order from LC. Mi $3.00, ph $6.30. PB 126634

This report presents a graph-theoretic characterization of the asymptotic forms of powers of matrices for two classes of matrices: finite-dimensional Boolean relation matrices and finite-dimensional stochastic matrices. The two classes of square matrices, under suitable interpretation, are clearly not disjoint. By the "asymptotic forms" of the powers of a given matrix is meant essentially the complete description of the location of zeros in the asymptotic development of the powers. Contract Nonr-1180(00), NR 047-012, Technical report A.

On the oscillation of solutions of self-adjoint linear differential equations of the fourth order, by Walter Leighton and Zeev Nehari. Carnegie Institute of Technology. Dept. of Mathematics, Pittsburgh, Pa. Mar 1957. 90p. Order from LC. Mi $4.80, ph $13.80. PB 126818

AD 120451. 1. Equations, Differential - Linear
2. Mathematical equations and solutions
3. Contract AF 18(600)-1138, Technical report 16
4. AF OSR TN 57-102

On X^2-statistics with variable intervals, by Anadi Ranjan Roy. Stanford University. Dept. of Statistics, Stanford, Calif. Jan 1956. 54p. Order from LC. Mi $3.60, ph $9.30. PB 126776

The X^2-statistic is used as a test of goodness of fit in various situations. The usual situation met with is the one where it is required to find out if an observed sample could arise from a specified probability distribution. Contract Nonr-225(21), NR 042-993. SU DS TR 1.

Pólya type distributions. IV: Some principles of selecting a single procedure from a complete class, by Samuel Karlin. Stanford University. Dept. of Statistics, Stanford, Calif. Mar 1957. 39p. Order from LC. Mi $3.00, ph $6.30. PB 132762

In previous publications various aspects of decision theory in which the underlying distributions are Pólya type have been studied. For example, complete classes of decision procedures were determined, all Bayes procedures were characterized, and the problem of admissibility was investigated as related to various kinds of loss functions. It is the object of this paper to discuss some further principles which select a single statistical procedure from the class of all monotone procedures. Contract Nonr-225(21), NR 042-993. SU DS TR 10.

Several methods of solving the heat conduction equation for steady-state one-dimensional heat flow in finite cylinders, by Robert E. Kidwell, Jr. U.S. Naval Research Laboratory. May 1958. 15p diagr, graphs. Order from LC. Mi $2.40, ph $3.30. PB 132873

Use of the digital differential analyzer, an iterative method, a method involving numerical integration, and the use of linear approximations for radiation are described and compared for the following boundary conditions: (a) the temperatures at both ends are constant, and (b) surface heat transfer occurs by convection and radiation. For the special case that the temperature at one end is at ambient temperature a linear approximation for radiation, referred to as the equal-area approximation, can be used to calculate heat loss with small error for a surprisingly wide temperature range. With nondimensional variables it is possible to provide uni-

versal solution curves for any desired range of dimensions, thermal constants, and boundary temperatures. NRL R 5137.

Sheath-helix parameter KQ for n = 1 mode, by Iwao Sugai. Polytechnic Institute of Brooklyn. Microwave Research Institute, Brooklyn, N.Y. Feb 1957. 20p graphs. Order from LC. Mi $2.40, ph $3.30. PB 127014

For the modes with angular variation in a sheath helix, the surface admittance presented to a thin hollow electron beam either inside or outside of the helix is derived for the general n-th mode in an exact form. Useful approximations are given for Pierce's K impedance. This approximation is very similar to previously obtained expressions. AD 120418. Contract AF 18(600)-1505. PIB 482. PIB R-554-57. AF OSR TN 57-75.

Some mathematical identities and numerical methods relating to the bivariate normal probability for circular regions, by Henry E. Fettis. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Aeronautical Research Laboratory, Wright-Patterson Air Force Base, Dayton, O. Dec 1957. 28p tables. Order from OTS. 75 cents. PB 131707

The problem of finding the probability of a bivariate normal distribution is of importance in connection with bonding and firing errors associated with a circular target. This report summarizes the various mathematical properties of the associated probability function, and gives several methods of quickly obtaining numerical values either by direct calculation or from existing tables. AD 142135. Project 5042, Continued under Project 7071. AF WADC TN 57-383.

Spinor transformations of Maxwell's equations, by H.E. Moses. New York University. Institute of Mathematical Sciences, New York, N.Y. Jan 1957. 45p. Order from LC. Mi $3.30, ph $7.80. PB 132814

1. Maxwell's field equations 2. Lorentz transformation theory 3. Mathematical equations and solutions 4. Contract DA 30-069-ORD-1258 5. NYU IMM 238

Statistical inference in factor analysis, by T.W. Anderson and Herman Rubin. Stanford University. Dept. of Statistics, Stanford, Calif. May 1955. 90p. Order from LC. Mi $4.80, ph $13.80. PB 127235

The primary aim of this paper is to give a unified exposition of this part of factor analysis from the viewpoint of the mathematical statistician. The literature on factor analysis is scattered; moreover, the many papers and books have been written from many different points of view. By confining ourselves to one model and by emphasizing statistical inferences for this model we hope to present a clear picture to the statistician. Contract N6onr-251, T.O. 3, NR 042-993. SU DS TR 30.

Study of the hydromagnetic induction equation, by Donald Skabelund. Utah. University. Dept. of Physics, Salt Lake City, Utah. May 1956. 43p. Order from LC. Mi $3.30, ph $7.80. PB 127008

The hydromagnetic induction equation for an unbound incompressible cosmic fluid of finite conductivity is considered. A partial integration is found possible in a linear velocity shear or when magnetic Reynolds number is large compared to unity. To complete this integration or to integrate the induction equation when there is no coupling between the components of the magnetic field leads to the "substantial diffusion equation." The integration of this equation is reduced to solving a Fredholm integral equation. Several relations of general interest for a Lagrangian description of fluid flow are obtained. Contract Nonr-1288(00). UU DP TR 20.

Synthesis of two factor analyses of intermediate algebra, by William E. Kline. Princeton University and Educational Testing Service, Inc., Princeton, N.J. Jun 1956. 147p diagrs, tables. Order from LC. Mi $7.20, ph $22.80. PB 126775

The battery of tests was factor-analyzed separately for each of the two classes by the Thurstone complete centroid method, producing 12 factors each. For each of the analyses principal axes were found. The latent roots for three factors in each analysis were so small that these factors were discarded from the test of congruence that followed. National Science Foundation Grant NSF-g-642. Thesis - Princeton University. Contract N6onr-270-20, NR 150-088.

Tables of the Herglotz polynomials of orders 3/2-8/2 transformation coefficients for spherical harmonics, by H.V. McIntosh, A. Kleppner, and D.F. Minner. U.S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Jul 1957. 162p tables. Order from LC. Mi $7.80, ph $25.80. PB 132784

Herglotz polynomials $H_{jk}^{p}(R)$ are the matrix elements of the unitary irreducible representations of the three-dimensional rotation group. This table describes the rotation R in terms of its Euler angles. D. A. project 5B0306002. Ordnance Research and Development project TB 3-0007. APG BRL M 1097.

Theory of position finding by the use of bearings, by Melville Roberts Klauber. Stanford University. Applied Mathematics and Statistics Laboratory, Stanford, Calif. Aug 1956. 24p graphs. Order from LC. Mi $2.70, ph $4.80. PB 129497

1. Position finding - Theory 2. Contract N6 onr-251(40), NR 342-022 3. SU AMSL TR 34

Three papers on the zero-order theory of the many body problem, by Jerome K. Percus and George J. Yevick. Stevens Institute of Technology. Dept. of Physics, Hoboken, N.J. n.d. 84p diagrs. Order from LC. Mi $4.80, ph $13.80. PB 126830

A "dynamical" Lagrangian approach to the many body problems in the collective coordinate formulation is made possible with the aid of the two-body correlation function. As a consequence, the values of the fictitious masses and frequencies for the collective coordinate harmonic oscillators, which represent the physical problem, are dependent on the average motion of the system. In Part B of the paper, preliminary considerations are presented on the physical extent of the domain of action of q-space; various techniques are utilized to probe its structure. Contract Nonr-26311, NR 017-617.

Translating from ordinary discourse into formal logic, a preliminary systems study. ACF Industries, Inc. Avion Division. Research Dept., Alexandria, Va. Dec 1956. 113p. Order from LC. Mi $6.00, ph $18.30. PB 126808

If a general-purpose logical computing machine were available for practical use, one of its most typical and important tasks would be, presumably, that of solving problems the constituents of which derive from ordinary discourse. In order to make its formal appearance in a problem to be solved by the methods of formal logic (i.e., symbolic logic), a statement made in ordinary discourse has ultimately to be symbolized. The total process of reformulation or transformation that culminates in symbolization may be regarded as a translation from (1) the natural language in which the statements are initially given to (2) the quasi-language of functional logic (i.e., a logical interpretation of a calculus of functions). AD 98813. Scientific report under Contract AF 19(604)-1582 for Sep 1, 1956 - Nov 30, 1956. AF CRC TN 56-770.

Uniqueness of mapping pairs for elliptic equations, by R.M. McLeod, J.J. Gergen, and F.G. Dressel. Duke University, Durham, N.C. Oct 1956. 20p. Order from LC. Mi $2.40, ph $3.30. PB 126774

AD 110373. Presented to the American Mathematical Society, Nov 30, 1956. For earlier report under this Contract see PB 124631. 1. Mathematical equations and solutions 2. Elliptic functions 3. Mapping (Mathematics) 4. Contract AF 18(600)-1341 5. AF OSR TN 56-554

Use of generalized probability paper for continuous distributions, by Herman Chernoff and Gerald J. Lieberman. Stanford University. Dept. of Statistics, Stanford, Calif. May 1955. 22p. Order from LC. Mi $2.70, ph $4.80. PB 127234

The problem of plotting on probability paper is extended to continuous distributions which are completely specified except for scale and location parameters. Necessary and sufficient conditions are given to ensure that the plot which is optimal for estimating the scale parameter is also optimal for estimating each of the percentiles. Contract N6 onr-251, T.O. 3, NR 042-993. SU DS TR 31.

MEDICAL RESEARCH AND PRACTICE

Analysis of the actions of adrenal cortical steroids and other agents on the cerebral cortex of the rabbit, by George A. Misraphy. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, O. Mar 1958. 95p diagrs, graphs, tables. Order from OTS. $2.25. PB 131804

The purpose of this investigation was to study the actions of adrenal cortical steriods and other agents on the cerebral cortex of the rabbit. Studies were conducted in the action of cortisone, compound F. desoxycorticosterone acetate (DOCA) and cholesterol on the excitation of peripheral nerves. It was found that, whereas DOCA and cholesterol had no consistent effect on thresholds, compound F and cortisone in general tended to elevate thresholds. In addition to cortisone, compound F and DOCA tended to prevent the spontaneous rhythmic activity of nerves placed in acid phosphate, whereas cholesterol had no effect. Arguments have been advanced which indicate that the depressant effects of cortisone on pheripheral nerves cannot account for the analgesic action of the compounds. AD 118077. Project 7210, Task 71733. Thesis: University of Chicago. AF WADC TR 57-114.

Cineradiographic technique for measuring heart size, by Alvin Shemesh. U.S. Army Medical Research Laboratory. Radiobiology Dept., Ft. Knox, Ky. Mar 1957. 18p photos, diagr. Order from LC. Mi $2.40, ph $3.30. PB 132781

Indirect 35 mm cineradiographs of the chest taken from a fluorescent screen ruled with a 5 mm square grid provide an accurate method of measuring heart area and volume. The same grid ruled on a standard screened cassette used with standard x-ray units offers a device for measurement of heat size in the absence of cineradiographic apparatus. A new measurement that may be of diagnostic value is introduced, namely: Maximum Heart Size - Minimum Heart Size. Project 6-59-08-012. AMRL R 266.

Progress report on hypoglycemia and cochlear microphonics, by Kempton G. Wing. U.S. Naval Medical Research Laboratory. Naval Submarine Base, New London, Conn. Jun 1954. 66p graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 130706

This report concerns the effects upon the electrical activity of the inner ear resulting from hypoglycemia produced in laboratory animals. NMRI Proj. NM 002 015.15.01 NAV MRL 255.

Respiratory management of severe nerve-gas casualties (U), by James O. Elam. U.S. Chemical Corps. Chemical Warfare Laboratories, Army Chemical Center, Md. Sep 1956. 24p drawings, tables. Order from LC. Mi $2.70, ph $4.80. PB 126916

The problems of the management of severe nerve gas casualties in man is reviewed from the standpoint of respiratory complications, current resources and doctrine, adequacy of present methods, and possibility of providing resuscitation under field conditions. The need for intensive training in simple resuscitation procedures for medical aidmen, corpsmen, and litter bearers is emphasized. Probably the most difficult skill to be mastered by the aidman is tracheal intubation. The evaluation of teachability of the technique in a manakin shows the feasibility of this approach. It appears now well established that nonprofessional laymen can be taught to perform tracheal intubation. Experience with patients poisoned with the anticholinesterase insecticides supports the plan of respiratory management herein proposed. Project no. 4-08-02-018-04. CC CWL R 2073.

Thermoelectric measurement of cerebral blood flow, by R.R. Sonnenschein. California. University. School of Medicine, Los Angeles, Calif. Mar 1958. 16p. Order from OTS. 50 cents. PB 131833

Regional cerebral blood flow was measured thermoelectrically, utilizing a heated thermistor probe. It was found that blood flow varied independently with arterial pressure and local vasomotion. Tissue oxygen tension was shown to be correlated with blood flow, oxygen saturation of the blood and oxygen utilization by the tissue. A local change in cortical blood flow accompanied spreading cortical depression. During the latter phenomenon, a change in surface pH occurred which was parallel to the changes in surface d.c. potential. It was concluded that the change in pH was intimately related to the mechanism of depression and constituted a major factor in the genesis of the d.c. potential shift. AD 151033. Project 7215, Task 71713. Contract AF 33(616)-2247. AF WADC TR 58-60.

METALS AND METAL PRODUCTS

Analysis of ferromagnetic and antiferromagnetic second order transitions, by J.A. Hofmann, A. Paskin, K.J. Tauer, and R.J. Weiss. U.S. Arsenal, Watertown, Mass. Ordnance Materials Research Office. Materials Research Laboratory, Watertown, Mass. Apr 1956. 43p graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 127495

Procedures are described for separating the magnetic contribution to the specific heats of ferromagnetic and antiferromagnetic materials. In analyzing antiferromagnetic salts, it is found that the specific heats of binary salts can be fitted by combinations of two Debye functions. In both ferromagnetic and antiferromagnetic substances the total energy of ordering is determined. OO project TB 4-911. DA project 593-26-006. WAL MRL 21.

Application of potential-time curves to the determination of corrosion tendencies and relative corrosion velocities of metals in coolant materials: Coolants, automotive engine and heat transfer media, by Milton Levy, C.F. Pickett, and R.P. Witt. U.S. Aberdeen Proving Ground. Development and Proof Services, Aberdeen, Md. Jun 1955. 41p diagr, graphs (part fold), tables. Order from LC. Mi $3.30, ph $7.80. PB 132838

Potential-time curves of aluminum, copper, solder, brass, steel, iron and combination electrodes were obtained in antifreeze media. Corrosion results obtained in these environments under the Florence Flask stationary corrosion, simulated vehicle cooling system, and polarographic analysis programs were compared and correlated with potential measurement data. In view of the fact that correlation with the corrosion in the simulated vehicle cooling system units on the critical cooling system metals, copper, brass, solder is excellent, it is recommended that potential measurements be utilized as an aid to a more rapid evaluation of antifreeze formulations as well as an assistance in the screening out of corrosion inhibitors which are ineffective. Ordnance project TB 5-8010A, 18th report. DA project 593-28-001. APG LSD 251.

Bimetallic corrosion in neutral electrolytes. Final technical report under Contract N6 onr-231, by C.W. Borgmann and R.T. Koenig. Colorado. University. Engineering Experiment Station, Boulder, Colo. Apr 1949. 108p photos, graphs, tables. Order from LC. Mi $9.60, ph $33.30. PB 130843

An experimental study of the factors governing bimetallic (or galvanic) corrosion of copper, nickel, aluminum, and nickel alloys together with carbon and stainless steel. Contains survey of literature

of bimetallic corrosion, total and partial immersion tests, measurement of polarization curves and galvanic currents, cathode and anode reactions, galvanic corrosion as indicated from polarization curves, and factors influencing intensity of corrosion. AD 143112.

Calculation of the elastic shear constants of magnesium and magnesium alloys, by John R. Reitz and Charles S. Smith. Case Institute of Technology. Dept. of Physics, Cleveland, O. Jul 1956. 25p diagrs, graph, tables. Order from LC. Mi $2.70, ph $4.80. PB 127395

Leigh's calculation of the elastic shear constants of aluminum are extended to include crystals of lower symmetry, and the results are used to interpret the constants of pure magnesium and dilute magnesium alloys. Contract N6 ori-273(03), NR 017-611. ONR TR 19.

Combustion of metals, by Aristid V. Grosse and Joseph B. Conway. Temple University. Research Institute, Philadelphia, Pa. Oct 1951. 53p photos, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 130421

Experimental techniques on studying the combustion of metals are divided into four sections, depending on the physical state of the metal fuel, namely, whether initially fed 1) in the solid bulk form; 2) as a liquid; 3) as a vapor, or 4) as a fine powder. Main methods used were A) the atmospheric pot-furnace; B) the high pressure reactor, and C) the centrifugal reactor. ATI 121407. High temperature project, First technical report. Photos will not reporduce well. Contract N9 onr-87301.

Correlations of the mechanical properties of TI-150A, RC-130A, RC-130B, TI-alloy and TI-75A titanium alloys, by J. G. Kaufman, T. G. Crum, and E. D'Appolonia. Carnegie Institute of Technology. Dept. of Civil Engineering, Pittsburgh, Pa. Apr 1954. 54p diagrs, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 132823

Reports tests to determine static and dynamic mechanical properties of five different titanium alloys Ti-150A, RC-130A, RC-130B, Ti-alloy and Ti-75A. Includes tension, torsion, impact, compression, hardness, and complete reversal fatigue tests. Data for each alloy are presented in graphs and tables and the mechanical and fatigue properties of the five alloys are correlated. Contract DA 36-061-ord-362. WAL R 401/68-38.

Development of cobalt-base alloys, by A. G. Metcalfe, J. B. McAndrew, D. W. Levinson, and D. J. McPherson. Armour Research Foundation, Chicago, Ill. Contract NOas 56-103-C. ARF Proj. B102. Order separate parts described below from LC, giving PB number of each part ordered.

Progress report no. 1, Mar 26-May 25, 1956. Jun 1956. 13p photos. Mi $2.40, ph $3.30. PB 130604

A survey of binary constitutional diagrams has been completed in order that various matrix compositions may be developed. The construction of a cacuum melting and casting unit has been continued.

Progress report no. 2, May 26-Jul 25, 1956. Aug 1956. 6p tables. Mi $1.80, ph $1.80. PB 130603

Concerns investigation of binary solid solution additions to cobalt for the purpose of selecting one or more matrices to be used as a basis for the design of more complex alloys. The elements chosen for study were twenty in all, and several levels of addition have been selected for each.

Progress report no. 3, Jul 26-Sep 25, 1956. Oct 1956. 10p graph, tables. Mi $1.80, ph $1.80. PB 130602

Data was obtained concerning the forgeability, oxidation resistance, hardness, machinability, and approximate density of a number of binary alloys. Preparation of other alloys was continued.

Progress report no. 4, Sep 26-Nov 25, 1956. Dec 1956. 10p graphs, tables. Mi $1.80, ph $1.80. PB 130601

Reports on preliminary tests of oxidation resistance, room temperature and hot tensile strength, and hardness measurements for a number of binary alloys. Twenty 250-gram button melts were prepared. Some rather remarkably high tensile strengths for binary alloys of this sort were observed.

Progress report no. 5, Nov 26, 1956-Jan 25, 1957. Jan 1957. 11p photos, table. Mi $2.40, ph $3.30. PB 130600

During this report period a satisfactory solution to the forging difficulty discussed in the preceding report was established. Additional tensile test data were obtained also, and processing of alloys was continued.

Progress report no. 6, Jan 26 -Mar 25, 1957. Apr 1957. 9p tables. Mi $1.80, ph $1.80. PB 130599

Includes the preparation of additional experimental alloys incorporating 0.4% cerium to control the effects of sulfur. Some of these alloys of the same composition except for the

cerium content. Further oxidation testing of alloys at 1700°F in still air and additional tensile data are available.

Summary report, Mar 26, 1956-May 25, 1957. Aug 1957. 34p photos, diagr, graphs, tables. Mi $3.00, ph $6.30. PB 130598

This report summarizes the first 14 months of effort in a research program which has the objective of developing new wrought cobalt-base alloys having improved high temperature properties. Rough screening type tests were used to evaluate the potentialities of a large number of binary alloys with respect to use as bases from which to evolve more complex compositions. The systems Co-Be, Co-Nb, Co-Ti, and Co-Cr were found to contain alloys worthy of further study. Observations on the forgeability of cobalt-rich alloys, and the effect of small additions of cerium, titanium, manganese, beryllium or mischmetal on forgeability are discussed.

Development of improved titanium-base alloys, by P.D. Frost and others. Battelle Memorial Institute, Columbus, O. Jan 1954. 133p photos, diagrs, graphs (part col), tables. Order from LC. Mi $6.90, ph $21.30. PB 130407

The major purpose of this contract was the development of titanium-base alloys with improved strength-ductility relationships, heat treatability, or weldability, or a combination of these properties. Considerable effort was expended on melting and fabricating selected high-strength alloys for evaluation by aircraft companies and other industrial organizations. The nominal compositions of the alloys selected for evaluation are as follows: Ti-3Mn-1Cr-1Fe-1Mo-1V, Ti-4Fe-1Cr-1Mn-1Mo-1V, Ti-5Mn-2.5Cr, Ti-3.5Cr-3.5Mn, Ti-4.5Mo-3.5Fe, Ti-3.5 Cr-3.5V. AD 53704. Covers work from 8 Dec 1952-7 Dec 1953 under Contract AF 33(616)-384. Color will not reproduce. AF WADC TR 54-205.

Development of tough, high strength, quarternary titanium-base alloys of the Ti-Al-V-X system, by W. F. Kirk and H. Margolin. New York University. College of Engineering. Research Division, University Heights, N.Y. Nov 1956. 104p photos, drawing, diagrs, graphs, tables. Order from OTS. $2.75. PB 131502

A group of twenty 1-1/4 lb ingots was prepared. The quarternary compositions were based on the Ti-Al-V alloys in which aluminum content varied from 4 to 8%, the vanadium from 2 to 4% and other additions from 2 to 4%. The aging behavior for three or four solution temperatures and four aging temperatures was studied. Jominy and end-quench tests and a few tensile tests were also carried out. The alloys are to be more fully evaluated as 6-lb ingots. Other 6-lb ingots are to be investigated as a result of the data obtained, and finally the Ti-6Al-4V and three other alloys will be investigated as 25-lb ingots. Ordnance project TB4-15. DA project DA-5B93-08-021. Contract DA 30-069-505-(P)-1506, Interim technical report no. 1. WAL R 401/272.

Ductile fracture of metals: Strain hardening of austenitic stainless steel, by G.W. Powell, E.R. Marshall, and W.A. Backofen. Massachusetts Institute of Technology. Dept. of Metallurgy. Metals Processing Division, Cambridge, Mass. Jun 1956. 57p photo, graphs, table. Order from LC. Mi $3.60, ph $9.30. PB 126908

The strain-hardening characteristics of types 301 and 304 austenitic stainless steel have been studied as functions of temperature, strain rate, and stress system, and correlated with quantitative determinations of the progress of the martensitic transformation. The experimental program involved: tension testing at various constant true-strain rated at 20°C (68°F), -78°C (-108°F). and -196°C (-320°F); constant head-speed tension testing at -263°C (-441°F); torsion testing at 20°C, -78°C, and 196°C; compression testing at 20°C. Contract N5 ori-078 (41), NR 031-356, Technical report no. 7.

Effect of internal heating on the fatigue properties of titanium, by J.P. Romualdi and E. D'Appolonia. Carnegie Institute of Technology. Dept. of Civil Engineering, Pittsburgh, Pa. Jul 1953. 51p photo, diagrs, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 132821

Presents results of tests to determine the effect of internal heating on the fatigue life of titanium. Tests indicate overheating is not appreciable in notched specimens at speeds up to 10,000 rpm. Contract DA 36-061-ord-259. WAL R 401/68-28.

Effect of iron on the magnetic properties of beryllium-copper, by Harold Bernstein. U.S. Naval Gun Factory. Engineering Research and Evaluation Division, Washington, D.C. May 1956. 22p photos, graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 127369

Beryllium-copper specimens containing graduated amounts of iron up to 1/2% were subjected to various heat treatments. Relative permeability and relative remanence were measured with an astatic magnetometer. Magnetic effects decreased with increased solution temperature and were proportional to iron content. After heat treatment at 1550°F, the effects were negligible. Magnetic properties were relatively unaffected by short time exposures to temperature up to 900°F. NGF TR 27-56. NAVORD 5179.

Effect of loading rate on the strength of single and multiple riveted joints, by Richard F. Klinger. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, O. Sep 1957. 15 diagrs,

graphs, table. Order from OTS. 50 cents.
PB 131513

Slow and rapid loading tensile shear tests were conducted at room temperature on single and multiple rivet lap and butt joints. The joints were manufactured with a standard pneumatic type rivet squeezer using 2117-T3 aluminum alloy rivets, 1/8 inch diameter, and Alclad 2024-T3 aluminum alloy sheet, 0.064" thick. The ultimate strengths of the joints were determined with times to the ultimate load of 0.02 and 60 seconds. All failures were rivet shear. The results indicate that the effect of rapid loading is to increase the strength of single riveted joints, that this effect is diminished as the number of rivets in the joint increases and that when the number of rivets in the joint is four and above the effect of rapid loading is to decrease the joint strength slightly. AD 131098. Project 7360, Task 73605. Covers work from Jan-Jun 1955. AF WADC TR 57-311.

Effect of structure and interstitials on the impact strength of titanium and titanium alloys, by Charles B. Dittmar, G. William Bauer, and Dillon Evers. Mallory-Sharon Titanium Corporation, Niles, O. Dec 1956. 30p photos, drawings, graphs, tables. Order from OTS. 75 cents. PB 131541

Variation in interstitial contents between 106 and 138 BHN sponge had little effect on the impact behavior of Ti-6Al-4V and Ti-3 Mn complex bars solution-treated-and-aged to 165,000 psi ultimate tensile strength. Employing 160 BHN sponge appreciably decreased the impact strength of Ti-6Al-4V. The Ti-Al-4V alloy had the highest impact strength, at any given temperature, of all the alloys investigated. AD 124489. Covers work from 1 Jul 1955-30 Jun 1956 under Contract NOas 54-370-C, Summary report, Phase 2.

Experimental magnesium alloys, edited by H. A. Johnson. Dow Chemical Co., Midland, Mich. Contract AF 33(600)-191(47). Order separate parts described below from LC, giving PB number of each part ordered.

Part 1: Further development of pellet fabricated magnesium alloys. Jun 1954. 62p photos, graphs, tables. Mi $3.90, ph $10.80.
PB 130394

The effect of melt and Mg-Al pellet additions on the properties of Mg-Zn-Zr pellet and/or ingot fabrications was investigated. The best combination of properties of Mg-Zn-Zr + Mg-Al pellet extrusions is obtained with ZK 60. AD 41427. Continues work under Contract W 33-038-ac-19884. AF WADC TR 54-83 Part 1.

Part 2: Wrought alloy survey of minor additions to selected Mg-base alloys. Jun 1954. 33p photos, tables. Mi $3.00, ph $6.30.
PB 130395

The effect of 1% additions of Ba, Cb, Cr, Hg, Li, MM, Mo, Pd, Se, Ta, Th, Ti, Tl, V, and W on the mechanical properties, workability, formability, corrosion resistance, and microstructure of Mg-3Zn and Mg-5 Al was investigated. Th greatly improves the strength of Mg-3Zn in both extrusions and rolled strip without an appreciable loss of toughness. Smaller strength increases are obtained by the addition of Li, Ba, and Pd to both base alloys and with Hg and Cr in Mg-3Zn. AD 41425. AF WADC TR 54-83, Part 2.

Part 3: Thermal and electrical properties of magnesium base alloys. Jun 1954. 38p graphs graphs, tables. Mi $3.00, ph $6.30.
PB 130409

The effect of crystal orientation on the electrical resistivity of high-purity magnesium was determined. The effect of temperature on the electrical resistivity for varying orientations was investigated. Extruded high-purity magnesium and ZK60A-T5 alloy were stressed in tension to various levels and the effect of this pre-stressing operation on the electrical resistivity recorded. The advantages and disadvantages of electric resistance strain gages as a method of measuring the coefficient of linear thermal expansion are discussed. AD 41426. AF WADC TR 54-83 Part 3.

Part 5: Welding tests on HK31A sheet. Jun 1954. 41p photos, diagrs, graph, tables. Mi $3.30, ph $7.80. PB 130954

The arc, gas and spot welding chacteristics of HK31A sheet and plate were investigated. Alloy was very weldable by the arc and spot methods but difficulty was encountered in gas welding. Heavy plate, multiple pass arc welds were subject to oxide inclusions, the cause of which has not been definitely established. Weld strengths could be improved by aging heat treatments. AD 41424. AF WADC TR 54-83, Part 5.

Fatigue studies of quenched and tempered nodular iron, by Phillip E. Goettsch. U.S. Arsenal, Rock Island, Ill. Oct 1956. 19p photos, drawings, graphs, tables. Order from OTS. 50 cents.
PB 131495

The report concludes that: 1. Endurance ratios of quenched and tempered nodular irons decreases as the hardness and tensile strength are increased. 2. An approximately linear relationship between ultimate tensile strength and endurance ratio exists within the hardness range tested. 3. The presence

of secondary graphite nodules in quenched and tempered nodular irons does not detrimentally affect the fatigue properties. AD 118468. Ordnance project TB 4-121E, Report 1. D.A. project 593-08-023. RIAL R 56-2974.

Fundamentals of the transition temperature phenomenon in steel. Fourteenth progress report for the period 1 Jan 1955-31 Mar 1955, under Contract Nonr-266(07), by M. Gensamer, F. Deronja, H. Hahn, and R.H. Dudley. Columbia University. School of Mines, New York, N.Y. Apr 1955. 9p fold graph, table. Order from LC. Mi $1.80, ph $1.80. PB 127030

For reports no. 8-13 see PB 114670, 116097, 116880, 117792, 119047 and 119645. 1. Steel - Transition temperature

Grain boundary control of gamma-type titanium-aluminum alloys. Report no. 7 covering the period 16 Nov 1956-15 Jan 1957, under Contract 55-952-C, by Robert H. Read and Cord H. Sump. Armour Research Foundation, Chicago, Ill. Jan 1957. 15p photos, diagr. Order from LC. Mi $2.40, ph $3.30. PB 132460

The investigation of titanium plus tungsten particles and titanium plus thoria particles obtained through oxidation of titanium-thorium pre-alloyed powders was begun. Two pieces of apparatus, a high temperature atmosphere ball mill for producing hydride powders and a vacuum hot pressing furnace, were constructed. ARF Proj B 093, Report no. 7.

High temperature-high pressure oxidation of pure metals in oxygen. Final report for Contract DA 04-495-ORD-237, by W. Martin Fassell, John P. Baur, Donald W. Bridges, Robert C. Peterson, and William M. McKewan. Utah. University. Dept. of Metallurgy, Salt Lake City, Utah. Nov 1955. 13p. Order from LC. Mi $2.40, ph $3.30. PB 127349

In this report a new theoretical concept was proposed to account for the type of oxidation followed by metals upon exposure to an oxidizing atmosphere at elevated temperatures. The hypothesis is based on the relative rates of oxidation and recrystallization-growth processes of the tarnish coating. If the recrystallization-growth rate of the oxide coating formed on the surface of the metal is greater than the rate of oxidation of the metal, the coating will be protective and hence will follow the parabolic equation. If the reverse situation is true, the coating will be non-protective and the rate of oxidation will be linear. Quantitative data are presented on 15 metals to substantiate the above concept. Dept. of the Army project no. 599-01-004. ORD project no. TB 2-0001, and TB 4-901. Dept. of the Army project no. DA 593-08-024. OORD project no. TB 4-161. WAL R 370/18-25.

High temperature scaling of Ni-Cr, Fe-Cr, Cu-Cr and Cu-Mn alloys, by C.A. Barrett, E.B. Evans and W.M. Baldwin, Jr. Case Institute of Technology. Dept. of Metallurgical Engineering, Cleveland, O. Dec 1955. 66p diagrs, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 130444

The high temperature scaling behavior in air of Ni-Cr, Fe-Cr, Cu-Cr and Cu-Mn alloys was studied. Chromium additions exceeding about 10 percent effected a tremendous decrease in the scaling rate of nickel and of iron. The best scaling resistance of both the Ni-Cr and Fe-Cr alloys was associated with about 20-25 percent chromium and was characteriszed by a scale consisting essentially of Cr_2O_3, not the spinel oxide. Chromium additions of up to 40 percent to copper had virtually no effect on the scaling resistance. AD 80835. D.A. project 5B99-01-004. Ordnance project TB 2-0001(499). Contract DA 33-019-ord-1077, 3rd (Final) technical report.

Investigation of low temperature internal friction in metals, by Hollis L. Caswell. Cornell University. Dept. of Engineering Physics, Ithaca, N.Y. Sep 1957. 134p photos, diagrs, graphs, tables. Order from LC. Mi $6.90, ph $21.30. PB 132423

Equipment and techniques were developed for measuring the internal friction and Young's modulus of copper crystals from $4^{o}K$ to $300^{o}K$ using longitudinal vibrations at a frequency of 38 to 42 kc. Measurements were made on pure (99.999%) copper crystals and on crystals containing various concentrations of gold or nickel. These were subjected to different amounts of cold-work and a variety of heat treatments. The strain amplitudes varied from as low as 10^{-9} cm/cm to a high as 10^{-6} to 10^{-4} cm/cm depending on the particular crystal. A comparison of the results with other experimental work and with several recent theories is given. AD 136597. Thesis - Cornell University. Contract AF 18(600)-1000, Technical report. AF OSR TR 57-69.

Investigation of the effects of stress concentration and triaxiality on the plastic flow of material. Part B, chapter IV: Drawing and extruding through stationary tools of circular contour under condition of plane strain, by G. Sachs and O. Hoffman. Case Institute of Technology. Dept. of Metallurgical Engineering. Metals Research Laboratory, Cleveland, O. Nov 1948. 13p diagr. Order from LC. Mi $2.40, ph $3.30. PB 126983

Drawing and extruding of a metal strip between two stationary cylindrical tools is analyzed, resulting in certain equations and expressions for stresses. AD 7399. For earlier report under this Contract see PB 119185. Contract N6 onr-273/1, NR 031-049, Technical report no. 12.

Investigations of surface properties of silicon and other semiconductors. Scientific report no. 1 for the period 1 Sep-30 Nov 1956, under Contract AF 19(604)-1952 and Contract AF 19(122)-458, subcontract 12, by H. E. Farnsworth, J. A. Dillon, Jr., and R. E. Schlier. Brown University. Dept. of Physics, Providence, R. I. Dec 1956. 17p diagrs. Order from LC. Mi $2.40, ph $3.30. PB 127211

The diffraction tubes for germanium and silicon crystals and for a tungsten crystal are described. Methods of preparing a (100) surface of silicon crystals and of measuring the work function of semiconductors are described. AD 110171. Contract AF 19(604)-1952, Scientific report no. 1. Contract AF 19(122)-458, Scientific report no. 1. AF CRC TN 56-976.

Investigation of the mechanism of flake - formation. Final report under Contract no. DA 33-019-ORD-897, by C. R. Garr and A. R. Troiano. Case Institute of Technology. Dept. of Metallurgical Engineering, Cleveland, O. Jul 1956. 45p photos, diagr, graph, table. Order from LC. Mi $3.30, ph $7.80. PB 132251

Deals with the effect of hydrogen and transformation stress on flaking. Results are presented on the influence of cooling stress, applied stress and alloy segregation as contributing factors in the flaking of alloy steel. AD 109515.

Kinetic study of the corrosion on nickel in sulfuric acid, by Charles H. Pitt and Milton E. Wadsworth. Utah. University. Institute for the Study of Rate Processes, Salt Lake City, Utah. Jan 1957. 24p graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 132477

The corrosion of nickel in sulfuric acid solution in the temperature range of 75°C to 125°C and from 0 to 600 psi partial oxygen pressure was investigated. The variation of rate as a function of agitation, time, acid concentration, and partial pressure of oxygen was determined. Contract N7 onr-45103, NR 051-192. UU ISRP TR 20.

Lattice defects in germanium and silicon and their effect on electrical properties. Second technical report for the period 1 Jul 1955-1Oct 1956 under Contract AF 18(600)-643, by P. L. Copeland, J. R. Madigan, and L. J. Fiegel. Illinois Institute of Technology. Physics Dept. Solid State Laboratory, Chicago, Ill. Feb 1957. 36p diagrs, graphs. Order from LC. Mi $3.00, ph $6.30. PB 126960

The equilibrium barrier height of a p-n junction rectifier was measured as a function of temperature from 77° to 373°K. The farrier height was determined by observing the saturation of the open circuit junction decays voltage with increasing forward bias. Measurements on silicon alloy junction diodes are in general agreement with this predicated behavior and because of the heavy doping of the emitter essentially described behavior of the Fermi level in the base region. AD 120422. Illinois Institute of Technology project no. 6073. Thesis by Leon J. Fiegel, Illinois Institute of Technology. Title of thesis "Temperature variation of equilibrium barrier height in a p-n junction." AF OSR TN 57-78.

Liquid metal heat transfer fluid: Unstressed static corrosion tests, by J. L. Everhart and E. L. Van Nuis. American Smeltering and Refining Company. Research Dept., Barber, N. J. Mar 1950. 17p photos, diagr, tables. Order from LC. Mi $2.40, ph $3.30. PB 130964

Unstressed static corrosion tests at 1200°F in liquid bismuth-lead, bismuth-lead-tin, and bismuth-indium-lead alloys were run on seventeen constructional materials. The severity of attack was determined qualitatively by means of microscopic examination. High chromium irons and similar alloys modified with aluminum and cobalt were the most resistant of the materials tested. ATI 86794. Report N-3. Contract N8 onr-64401, NR 031-312.

Machining titanium. Part II, by M. C. Shaw, P. A. Smith, B. Colding, and N. H. Cook. Massachusetts Institute of Technology. Dept. of Mechanical Engineering. Metals Processing Division, Cambridge, Mass. Feb 1957. 104p photos, graphs, tables. Order from OTS. $2.75. PB 131536

Machining characteristics of clamped carbide tools when machining titanium alloys and AISI 4340 steel are presented and compared. Optimum tool life for the 8-edged clamped carbide tool used here was found to be but about 17 minutes for any of the titanium alloys. Ceramic tools were found to give unusually poor results in machining titanium. Water-base cutting fluids were found effective in machining titanium, but all makes were not equally effective. Unlike steel under identical conditions, the relative amount of rake wear decreased when a titanium alloy was machined at increasing speed. Part I prepared by Machine Tool Division under Contract AF 33(600)-22674, Jun 1954. Contract AF 33(600)-31636.

Magnetic viscosity in 4-79 Moly Permalloy, by Oscar J. Van Sant. U.S. Naval Ordnance Laboratory, White Oak, Md. Dec 1956. 27p diagr, graphs. Order from LC. Mi $2.70, ph $4.80. PB 132449

An important and useful expression is presented which relates B, H, time, and magnetic viscosity when 4-79 Moly Permalloy is operating in a reversible region of its hysteresis loop. A correlation exists between the behavior of the magnetic material when excited by low frequency sinusoidal currents and the transient behavior occurring in the millimicrosecond region when excited by a step-function current. The effect of the viscosity coefficient on

the dynamic behavior of the magnetic material is quantitatively shown. NAVORD 4401.

Mechanical properties of a shell steel at rapid-loading rates, by Rolf Weil. U.S. Picatinny Arsenal. Samuel Feltman Ammunition Laboratories, Dover, N.J. Mar 1957. 24p photo, drawing, diagr, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 127367

The strength properties of many metals are higher in tests conducted at fast loading rates than in the conventional tension tests. When metals of the body-centered cubic lattice structure, which also show a definite upper yield point, are loaded rapidly to stresses above their static yield points, there is a time delay before plastic deformation begins. It was found that the application of these data to a 75 mm shell would permit the use of a steel with a yield point 14% lower than would be required if static test data were used. Ordnance project TA 1-5005. D.A. project 5A-04-03-061. PA TR 2400.

Metallographic study of the effect of sensitive tint illumination of the carbides of bainite and martensite, by Ralph H. Hiltz, Jr. U.S. Arsenal Watertown, Mass. Mar 1955. 17p photos (part col), table. Order from LC. Mi $2.40, ph $3.30. PB 127473

Bainite and martensite in steel exhibit different degrees of optical anistropy in response to polarized illumination. This difference is a maximum in the as-quenched state and decreases towards zero with tempering, as a function of time and temperature. Sensitive tint illumination, modified by placing monochromatic filters in the light system, is more responsive to slight differences in anistropy than other types of polarized light. This illumination makes possible detection of the anistropic difference and thus the differentiation of tempered bainite and tempered martensite. A limit is placed on the method by the diffusion process occurring during tempering. This limit, a function of compositional difference and inter-carbide spacing, varies for each type of steel, and usually occurs well beyond normal tempering times. O.O. project TB 4-121. D/A priority 1C. Color will not reproduce. WAL R 132/23.

New method for the analysis of slow-bend fracture tests, by R.M. Trimble. U.S. Naval Research Laboratory. May 1958. 12p photo, diagrs, graphs. Order from LC. Mi $2.40, ph $3.30. PB 130315

An experimental procedure has been developed by which a number of specimens with saw-cut notches of different depths can be used to establish characteristics curves showing (a) the stored elastic energy E, (b) the recoverable elastic deflection 1_e, (c) the spring constant M of the specimen, (d) the load F supported by a specimen with crack depth x, (e) the total work for fracture propagation, and (f) the part of that work G not associated with permanent set, all as functions of the crack depth. NRL R 5116.

Notch ductility of normalized HTS steel, by P.P. Puzak. U.S. Naval Research Laboratory. Sep 1957. 16p graphs, tables. Order from LC. M $2.40, ph $3.30. PB 128492

A cooperative program of notch-ductility studies was established between the U.S. Naval Research Laboratory, the Bureau of Ships, and the New York Naval Shipyard to determine the characteristics of recent-production, normalized HTS plate from various steel manufacturers. In addition, the determination of the relative effect on notch ductility of high (0.08 to 0.12 percent) vanadium additions to these steels was included. NRL R 5007.

I. Segregation substructure in aluminum. II. Iron-chromium-nickel ternary system. III. Relationship of ductility to the creep curve. IV. Creep and structure studies of two-phase aluminum-copper alloys. Periodic status report no. 18 covering the period 1 Nov 1956-1 Feb 1957, under Contract Nonr-1841(28), by Frank B. Cuff, Jr., P.E. Price, and others. Massachusetts Institute of Technology. Dept. of Metallurgy, Cambridge, Mass. Mar 1957. 4p. Order from LC. Mi $1.80, ph $1.80. PB 132542

1. Aluminum alloys - Creep tests 2. Aluminum alloys - Creep - Measurement 3. Chromium-iron-nickel alloys.

Short time elevated temperature properties of gun steels, by Frank R. Larson. U.S. Arsenal, Watertown, Mass. Oct 1956. 64p photos, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 127443

Eleven heats of 0.30 percent carbon steel, five chromium-molybdenum-vanadium, five chromium-molybdenum-titanium, and one base composition were subjected to various heat treatments and then screened by testing their hot-hardness characteristics at 500°F. The minimum decrease in yield strength (0.10% offset) from room temperature to 500°F was 13.8%. O.O. project TS 4-4020. D/A project 5S02-09-001. WAL R 372/27.

Strength, damping, and elasticity of materials under increasing reversed stress with reference to accelerated fatigue testing, by F.H. Vitovec and B.J. Lazan. Minnesota. University, Minneapolis, Minn. Jun 1955. 39p photos, graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 132275

The purpose was to investigate damping, stress-strain, and failure properties under uniformly increasing stress amplitude and relation of these properties, to conventionally determined fatigue

strength. SAE 1020 steel, 24S-T4 aluminum alloy, SAE 4340 steel, and RC-55 titanium under rotating bending stress amplitudes which (a) are progressively increased during the test and (b) are held constant as in conventional fatigue tests. The Gough dynamic proportional limit method and the Lehr damping intercept under uniformly increasing stress amplitude were found to agree with the conventional fatigue strength only for certain materials and to be misleasing in other cases. AD 75853. Project 7360 and 3346, Task 73604 and 73498. Covers work from Jan 1953-Dec 1954 under Contract AF 33(038)-20840. AF WADC TR 55-225.

Study of creep of titanium and two of its alloys, by Jeremy V. Gluck and James W. Freeman. Michigan. University. Engineering Research Institute, Ann Arbor, Mich. Mar 1956. 192p photos, graphs, tables. Order from LC. Mi $8.70, ph $30.30. PB 132283

Metallurgical factors influencing the creep of commercially pure titanium (Ti 75A), a 7-percent manganese alloy (RC 130A) and a chromium-alloy (Ti 150A) in the form of sheet were studied at 76° 210°, 400° and 600°F. Rapid and extensive creep was found at stresses only a fraction of the yield strength at all temperatures. AD 93169. Project 7351, Task 70627. Contract AF 33(038)-14111. AF WADC TR 54-54.

Study of the internal friction and Young's modulus of pure copper single crystals in the temperature range 25°C to 750°C, by Louis A. Kamentsky. Cornell University. Dept. of Engineering Physics, Ithaca, N.Y. Sep 1956. 139p photos, diagrs, graphs (part fold), tables. Order from LC. Mi $6.90, ph $24.30. PB 127134

Equipment and techniques were developed for measuring internal friction and Young's modulus of pure well annealed single crystals of copper in the temperature range of 25°C to 750°C, the frequency range of 700 to 7600 cps, and the strain amplitude range 10^{-8} to 10^{-5}. AD 96507. Thesis-Cornell University. Work was begun under Contract N6 ori-91, T.O. 2. Contract AF 18(600)-1000, Technical report no. 1. AF OSR TN 56-425.

Supersonic axially symmetric nozzles, by R. F. Clippinger, U.S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Dec 1951. 37p graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 127046

A number of theoretical wall contours have been calculated for axially symmetrical nozzles. The calculations were performed for twenty-one Mach numbers, covering a range from 1.008 to 8.238, and for 10 different contours at each Mach number Partial results for five Mach numbers are presented here in the form of sets of coordinates on each contour, together with flow direction, velocity, and pressure parameters at each point. To make it possible to define the nozzle contour at closely-spaced points, formulae are given for interpolation along the wall contour between tabulated points. APG BRL R 794.

Survey of the extent of testing facilities for the determination of mechanical and physical properties of metals at various temperatures, by W.P. Achbach. Battelle Memorial Institute. Titanium Metallurgical Laboratory, Columbus, O. Apr 1957. 350p drawing, diagrs, table. Order from LC. Mi $11.10, ph $53.10. PB 132869

This report contains an account of the extent of facilities available for obtaining mechanical and physical properties of metals at various temperatures. Approximately 750 organizations were contacted to determine this information. Brief, detailed descriptions are presented under major testing areas for each organization supplying such information. In most cases testing temperatures, limits of control, and testing procedures for the various types of tests are enumerated. Contract AF 18 (600)-1375. BMI TML 70.

Temperature dependence of the yield stress of copper and aluminum. Final report under Contract AF 18(600)-1021, by W.D. Sylwestrowicz and E. Orowan. Massachusetts Institute of Technology. Dept. of Mechanical Engineering, Cambridge, Mass. Aug 1957. 35p diagr, graphs. Order from LC. Mi $3.00, ph $6.30. PB 132424

For high purity copper and aluminum, the effect of the temperature upon the yield stress of the specimens having a given yield stress at a given temperature is independent of the mechanical-thermal history in the course of which the yield stress was acquired. The ratio of the yield stress to Young's modulus is strongly dependent of the temperature. AD 136618. D.S.R. proj 7191. AF OSR TR 57-71.

Vibratory compacting of metal and ceramic powders. Part 2, by W.C. Bell, R.D. Dillender, and others. North Carolina State College. Dept. of Engineering Research, Raleigh, N.C. Apr 1954. 79p photos, drawings, diagrs, graphs, tables. Order from LC. Mi $4.50, ph $12.30. PB 133012

This investigation has been primarily concerned with the low-frequency vibratory forming of alumina, nickel-titanium carbide and chromium-alumina powders. The influence of a wide variety of particle size distributions of the powders on the forming, sintering and physical properties of these compositions has been studied. An instrumentation system was developed for measuring the vibratory forces employed. Results obtained with the use of a wide range of low-frequency vibratory forming techniques are reported. Similar compositions were formed by dry pressing followed by hydrostatic repressing and the properties of the specimens formed by the two methods have been compared. The vibratory

forming method was found to offer a number of advantages over the hydrostatic method. For Parts 1 and 3 see PB 111435 and 121255. AD 51056. Task 70634. Covers work from 20 Apr 1953-20 Apr 1954 under Contract AF 33(616)-73. AFWADC TR 53-193, Part 2.

METEOROLOGY AND CLIMATOLOGY

Air over Louisville; summary of a joint report by the Special Air Pollution Study of Louisville and Jefferson County, Ky., 1956-1957. n.d. (Date is 1957 or 1958). 57p photos, maps, tables. Available from Chief, State and Community Services Section. Community Air Pollution Program, Public Health Service, Robert A. Taft Sanitary Engineering Center, Cincinnati 26, O.

Ground-based observations of the vertical atmospheric haze structure, by G. L. Knestrick. U.S. Naval Research Laboratory. May 1958. 11p photos, graphs. Order from LC. Mi $2.40, ph $3.30. PB 132000

Measurements of the vertical structure of the atmosphere have been conducted by others largely by airborne means. As a result of some of these measurements a correlation between microwave refractive modulus and volume scattering of light was discovered. The purpose of the present work was to determine if this correlation could be detected from the ground and concerns the optical portion of the experiment. NRL R 5130.

The absorption spectrum from 0.5 to 25 microns of a 1000-ft atmospheric path at sea levels, by H.W. Yates. U.S. Naval Research Laboratory. Sep 1957. 13p fold. graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 132876

One infrared absorption spectrum from 0.5 to 25 μ of a 1000-ft-long atmospheric path at sea level is presented. The resolution is between 1 and 2 wave numbers over a considerable portion of this spectral region and is sufficient to allow the identification of structure attributable to some of the rarer constituents of the atmosphere such as N_2O, CH_4, and HDO. NRL R 5033.

PACKING AND PACKAGING

Compatibility of VCI with rubber, by Ralph L. LeMar. U.S. Arsenal, Rock Island, Ill. Sep 1957. 23p tables. Order from OTS. 75 cents. PB 131544

Four different VCI papers were wrapped about samples of 5 representative rubber formulations. These combinations were exposed to dry and moist aging at 130 F. Thereafter, effects of the VCI were determined by analysis of the volume change, elongation and tensile properties of the rubber. Kraft paper wrapped specimens served as controls. VCI papers, in general, are recommended for the preservation of ferrous metal items where rubber fabrications are an integral part of the preserved plan. Project TB 5-6010. DA project 593-21-055. RIAL R 57-2218.

Flex test for watervaporproof barrier materials, by Roswell H. Evans and Seymour Liff. U.S. Picatinny Arsenal. Samuel Feltman Ammunition Laboratories, Dover, N.J. Jun 1956. 61p photos, drawings, tables. Order from LC. Mi $3.80, ph $10.80. PB 127359

Ordnance project TB 4-672, Sub-task TB 4-672D. Dept. of the Army project 591-07-001.
1. Barrier materials - Water resistance - Testing
2. Barrier materials - Specifications 3. PA TR 2302

PERSONNEL APTITUDE TESTING

Empirical test of shrinkage problems in personnel classification research, by W.H. Helme, W.A. Gibson, and H.E. Brogden. U.S. Adjutant General's Office. Personnel Research Branch, Washington, D.C. Oct 1957. 34p tables. Order from LC. Mi $3.00, ph $6.30. PB 132902

The present study was undertaken to determine the need for cross validation procedures in estimating validity of the Army Classification Battery for various job families. Data already available from studies on prediction of success in 35 Army school courses were used. The jobs corresponding to these courses were clustered according to the pattern of the standard regression coefficients for all 10 ACB tests. Validity coefficients and intercorrelations were obtained for the 10-test composites. Comparison of these estimates formed the basis for deciding whether single samples on each MOS would provide the data necessary for reconstitution of the Aptitude Area system. WD AGO TRN 84.

Evaluation of experimental perceptual speed tests, by J. Zeidner, L.G. Goldstein, and E.K. Karcher. U.S. Adjutant General's Office. Personnel Research Branch, Washington, D.C. Oct 1956. 22p tables. Order from LC. Mi $2.70, ph $4.80. PB 132905

The objective of this study was to evaluate three new, experimental, perceptual speed tests for any contribution they might make towards improving the efficiency of the ACB. The evaluation of the experimental perceptual speed tests involved determination

of the following: 1. Reliability of the experimental tests; 2. Correlation of the experimental tests with tests in the ACB; 3. Intercorrelation of the perceptual speed tests; and 4. Initial validity information. DA project 29560000, Task 250. PRB project B-6-250-33. WD AGO TRN 61.

Prediction of success in carrier repair, teletype maintenance, and power equipment maintenance courses, by William H. Helme, James B. Trump, and Richard K. White. U.S. Adjutant General's Office. Personnel Research Branch, Washington, D.C. Oct 1957. 18p table. Order from LC. Mi $2.40, ph $3.30. PB 132903

This study was one of a series evaluating the Army Classification Battery (ACB) for effectiveness in predicting success in Army school courses. The objective was to determine the effectiveness of various composites of ACB test scores for predicting performance in repeater and carrier equipment installation and maintenance, and power equipment maintenance courses. Scores on the aptitude area of selection and scores on an alternate aptitude area were compared with final course grades of 2766 enlisted men who completed the courses between February 1952 and Mar 1955. DA project 29560000. WD AGO TRN 83.

Prediction of success in transportation movement and supply courses, by William H. Helme and R.A. White. U.S. Adjutant General's Office. Personnel Research Branch, Washington, D.C. Jun 1957. 16p table. Order from LC. Mi $2.40, ph $3.30. PB 132904

The effectiveness of ACB composites in predicting success in three clerical area courses--transportation movement control, supply records, and unit supply-- was studied. DA project 29560000. WD AGO TRN 74.

PHOTOGRAPHIC AND OPTICAL GOODS

Employment of lead screens to improve industrial radiographic inspection methods, by Catherine Grogan, Maurice G. Keefe, and Catherine A. Penrose. U.S. Arsenal, Watervliet, N.Y. Jan 1957. 57p graphs, tables. Order from OTS. $1.50. PB 131537

(1) X-raying steel plates of thicknesses from 1" to 10"; (2) Using 250 KV, 1 MEV and 24 MEV energy xray sources; (3) Employing four commercially available industrial films; (4) Varying the lead screens from no screens to screens having a maximum thickness of .040". In every case, when no lead screens were employed, penetrameter and crack images were poorly defined. Therefore for maximum sensitivity, the use of lead screens in industrial radiography is essential. While all the films used improved either in definition and/or in density with screening, the optimum screening for any given set of conditions varied somewhat with the type of film used. PESD 60304231-11-01201-00. WAL MR 207.

Radiographic standards for bronze castings for x-rays (to 400 KVP) and iridium (192). U.S. Bureau of Ships. n.d. 29p photos, tables. Order from OTS. $25.00. PB 131854

These standards are to be used for comparison with radiographs from actual castings. They are considered applicable to sections up to two inches in thickness, when medium voltage x-rays or iridium 192 are used as sources. NAVSHIPS 250-537-1.

PHYSICS

General

Calculation of the wall temperature along surfaces which are exposed to a fluid stream when the local heat flow through the surfaces is prescribed, by E.R.G. Eckert, J.P. Hartnett, and Roland Birkebak. Minnesota. University. Heat Transfer Laboratory, Minneapolis, Minn. May 1957. 31p graphs, tables. Order from OTS. $1.00. PB 131763

A simple design procedure is developed for the calculation of the wall temperature along surfaces with a prescribed heat flow distribution. The method is applicable to either laminar or turbulent boundary layer flow with zero pressure gradient. Examples are presented to illustrate the calculation procedure for several heat rate distributions. AD 118333. Project 1366, Task 70138. Contract AF 33(616)-3038. AF WADC TR 57-315.

Correlation between the dynamic properties of a pair of impinging streams and the uniformity of mixture-ratio distribution in the resulting spray, by Jack H. Rupe. California Institute of Technology. Jet Propulsion Laboratory, Pasadena, Calif. Mar 1956. 18p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 130953

The mixture-ratio distribution in the spray resulting from a pair of impinging streams has been evaluated in an experimental investigation that is in essence a supplement to JPL Progress Report No. 20-195. This data, together with a revised analytical approach, has indicated an approximate correlation between certain spray characteristics and injector-design parameters. It was concluded that the most uniform distribution of the weight ratio of the two components in the spray produced by a pair of impinging streams is attained when the product of velocity head ratio and the diameter ratio for the two streams is unity. Contract DA 04-495-ORD-18. CIT JPL 20-209.

Dispersion relations for non-relativistic particles, by David Y. Wong. Maryland. University. Physics Dept. College Park, Md. Jan 1957. 12p. Order from LC. Mi $2.40, ph $3.30. PB 126972

AD 115073. Project no. 37506.
1. Particles - Scattering - Theory 2. Particles - Velocity - Calculation 3. Perturbation - Theory 4. Green's function 5. Contract AF 49(638)-24 6. AF OSR TN 57-35 7. UM TR 62

Heat transfer of a laminar pipe flow with coolant injection, by S. W. Yuan and A. B. Finkelstein. Polytechnic Institute of Brooklyn, Brooklyn, N.Y. Mar 1956. 15p diagr, graphs. Order from LC. Mi $2.40, ph $3.30. PB 133027

The effect of coolant injection at the wall on the temperature distribution of the laminar flow of a fluid in a porous wall pipe has been investigated. The temperature distributions in the pipe for various fluid injections are obtained by solving the energy equation. The results are expressed in terms of Nusselt number as function of the Péclet number, the dimensions of the pipe and the coolant flow. The relation between the wall temperature and the rate of coolant injection is also calculated. Submitted for presentation at the Heat Transfer and Fluid Mechanics meeting, June 21-23, 1956, at Stanford University. Project Squid. Contract N6 ori-105, T.O. 3, NR 098-038. PIB 27.

Incompressible friction factor, transition and hydrodynamic entrance length studies of ducts with triangular and rectangular cross-sections, by E. R. G. Eckert and T. F. Irvine, Jr. Minnesota. University. Heat Transfer Laboratory, Minneapolis, Minn. Apr 1957. 41p diagrs, graphs, tables. Order from OTS. $1.25. PB 131771

Measurements are presented on friction factors, critical Reynolds numbers, and hydrodynamic entrance lengths of air flowing with supersonic velocities through non-circular ducts. The results of these measurements clarify discrepancies which existed in the literature on friction factors for developed laminar flow. They give information on hydrodynamic entrance lengths and on critical Reynolds numbers for transition to turbulence. AD 151027. Project 54-630-496, Task 70143. Contract AF 33(616)-474. AF WADC TR 58-85.

On steady state bubbles generated by Taylor instability, by P. R. Garabedian. Stanford University. Applied Mathematics and Statistics Laboratory, Stanford, Calif. Jan 1957. 20p. Order from LC. Mi $2.40, ph $3.30. PB 132473

A theory of the steady motion of a long bubble rising through an infinite plane vertical tube of liquid is presented. It is shown that, contrary to current belief, the flow is not uniquely determined by the width of the tube and the acceleration of gravity alone, but that the speed of the bubble can also be prescribed. Contract Nonr-225(11), NR 041-086. SU AMSL TR 59.

Potential flow solution with applications in studies concerning mass addition along the boundaries of the flow, by J. Leith Potter and Norman M. Shapiro. U.S. Redstone Arsenal. Research Laboratories. Ordnance Missile Laboratories, Huntsville, Ala. Jun 1956. 14p diagrs, graphs. Order from LC. Mi $2.40, ph $3.30. PB 127154

Potential flow methods are used for the mathematical analysis of a class of two-dimensional containers characterized by mass addition from opposite walls. The containers are closed at one end and open at the opposite end. Resulting streamline patterns and velocity distributions are shown for two examples wherein parallel and divergent walls are compared Project TB 2-0001. Contribution no. 30 of the Research Laboratories, Ordnance Missile Laboratories, Redstone Arsenal. RSA OML R 2R 16F.

Nuclear

Excitation of molecular vibration by collision, by Morris Salkoff and Ernest Bauer. New York University. Institute of Mathematical Sciences. Division of Electromagnetic Research, New York, N.Y. Jul 1957. 61p graphs. Order from LC. Mi $3.90, ph $10.80. PB 132006

The cross section for excitation of the first vibrational level in the collision of two hydrogen molecules in the ground state is calculated. A perturbation scheme must be used because of the many-body problem involved. The cross section is calculated by a partial wave analysis. The collision of two H_2 molecules is considered because the intermolecular potential is reasonably well known for this case. AD 133673. Contract AF 19(604)-1705. NYU RR CX-31. AF CRC TN 57-209.

Isotopic spin selection rule $|\Delta I| = 1/2$ for the decays of strange particles, by Masaaki Kawaguchi. Purdue University. Dept. of Physics, Lafayette, Ind. Mar 1957. 17p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 127462

AD 120487. 1. Particles, Charged - Motion - Theory 2. Atomic power - Research 3. Contract AF 18(600)-1579 4. AF OSR TN 57-131

Lifetimes of the τ^+ and K^+-mesons, by G. Harris, J. Orear and S. Taylor. Columbia University. Dept. of Physics. Nevis Cyclotron Laboratories, New York, N.Y. Aug 1955. 4p table. Order from LC. Mi $1.80, ph $1.80. PB 127182

Preliminary lifetime values have been obtained for τ^+ and K_2^+-mesons by measuring the Bevatron K-

beam attenuation relative to the beam pions and protons of the same momentum over a distance of 70 inches (proper time of 0.82×10^{-8} sec). Two identical stacks of 39 Ilford G5 pellicles, 6 inches by 7 inches 600, were exposed separately 70 inches aprat using the same copper target and Bevatron energy of 6.2 Bev. CU 91-55-ONR-110-1-Physics. Joint ONR-AEC program. Contract N6 ori-110, T.O. 1. R-111. CU-91.

Many body problems in quantum field theory, by Abraham Klein and Charles Zemach. Pennsylvania. University, Philadelphia, Pa. Mar 1957. 36p. Order from LC. Mi $3.00, ph $6.30. PB 126937

A formalism for the convariant description of scattering processes involving composite particles is derived from irst principles. Its basic ingredients are the Green's functions of quantum field theory combined with a physically sound formulation of the adiabatic hypothesis. Explicit expressions are presented for various examples of nucleon-nucleus and boson-nucleus collisions. It is shown that the impulse approximation can be formulated for such problems. A general method of obtaining electromagnetic moments of nuclei, based on the scattering formalism, is also derived. The normalization condition for covariant amplitudes is discussed and its application to bound-state problems reviewed. In particular, a method of carrying out perturbation theory for the discrete spectrum is suggested. AD 120489. Technical note no. 7. Contract AF 18(603)-60. AF OSR TN 57-133.

NOL reactor safety program, by Paul M. Fye and E.C. Noonan. U.S. Naval Ordnance Laboratory, White Oak, Md. Apr 1956. 11p photos. Order from LC. Mi $2.40, ph $3.30. PB 132447

This report consists of a paper prepared for the U.S.-U.K. Reactor Hazards Meeting held on June 12, 13 and 14, 1956 at the Argonne National Laboratory, Chicago, Illinois. NAVORD 4286.

Parity exchange scattering, by D.C. Peaslee. Purdue University, Lafayette, Ind. Dec 1956. 6p. Order from LC. Mi $1.80, ph $1.80. PB 126864

AD 115037. 1. Atomic power - Research 2. Mesotrons - Scattering - Theory 3. Contract AF 18(600)-1579 4. AF OSR TN 57-6

Reactions of stopped π mesons in hydrogen and deuterium, by William Chinowsky. Columbia University. Physics Dept. Nevis Cyclotron Laboratories, Irvington-on-Hudson, N.Y. Apr 1955. 45p diagrs, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 127028

Joint ONR-AEC program. CU-83-ONR-110-1-Physics. Thesis, Columbia University. 1. Atomic power - Research 2. Hydrogen - Molecular reactions 3. Deuterium - Molecular reactions 4. Contract N6 ori-110(T.O. 1) 5. NEVIS 9. 6. R-104

PHYSIOLOGY

Diurnal oxygen consumption and rectal temperature of man during continuous cold exposure, by P.F. Iampietro, David E. Bass, and Elsworth R. Buskirk. U.S. Army. Quartermaster Research and Engineering Command. Environmental Protection Research Division, Quartermaster Research and Engineering Center, Natick, Mass. Oct 1957. 9p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 132906

Effects of continuous cold stress on daily patterns of oxygen consumption and rectal temperature were studied in five men. Cold stress consisted of living continuously in a chamber of 60°F. for 14 days, wearing only shorts and taking minimal physical activity. The results indicate that rectal temperature was well maintained during cold exposure, and oxygen consumption appeared to respond in such a fashion as to subserve this maintenance. Project 7-83-01-005B. QMC EP TR 67.

Skeletal age changes in young American males, by Thomas W. McKern and T.D. Stewart. U.S. Quartermaster Research and Development Command. Environmental Protection Research Division, Quartermaster Research and Development Center, Natick, Mass. May 1957. 190p photos, map, diagr, graphs, tables. Order from LC. Mi $8.40, ph $28.80. PB 132957

The report is divided into eleven chapters; ten outline the progress of age changes in selected skeletal segments and one, the eleventh, portrays the total pattern of skeletal maturation. To further aid the observer, each chapter includes complete tabular and detailed photographic evidence of the exact nature of skeletal age changes for the particular area concerned. Also, new methods for determining age estimations have been introduced. QMC EP TR 45.

Skin resistance changes during acceleration, by Sanford I. Cohen, Albert J. Silverman, George D. Zuidema, and Gilbert E. Johnson. U.S. Air Force. Air Research and Development Command. Wright Air and Development Center. Aero Medical Laboratory, Wright Patterson Air Force Base, Dayton, O. Apr 1958. 13p graphs. Order from OTS. 50 cents. PB 131853

Basal skin resistance level changes are felt to be due primarily to changes in over-all central nervous system arousal, as reflected in alterations in autonomic nervous system activity. Human subjects exposed to centrifugal forces demonstrated decreases in skin resistance. Rapid onset acceleration pro-

duces greater decreases in skin resistance than gradual onset acceleration or rapid onset acceleration of subjects protected by anti-G suits. The role of blood volume changes and compensatory sympathetic vasoconstrictive activity as the primary determinant of skin resistance decreases during acceleration was investigated. AD 97275. Project 7215, Task 71713. AF WADC TN 56-397.

PSYCHOLOGY

Accuracy of blind positioning of a rotary control, by Darwin P. Hunt and Melvin J. Warrick. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, O. Mar 1957. 13p drawings, graphs, table. Order from OTS. 50 cents. PB 131695

The accuracy of blindly positioning a bar type rotary control knob was investigated. Four subjects made right-handed and left-handed blind settings with a tapered and with a parallel-sided knob. The range of the setting errors was approximately 28° for the tapered knob and 22° for the parallel-sided knob. For accuracy of blind setting, it appears that a parallel-sided bar knob is superior to a tapered bar knob and that, for ease of accurate setting, the spacing between discrete positions of the control should be approximately 35° or more. AD 142291. Project 7182, Task 71514. Contract AF18 (600)-50. Contract AF 33(616)-3404. AF WADC TN 52-106.

Comparative analysis of normal speech and speech with delayed side-tone by means of sound spectrograms, by Anita I. Rawnsley and J. Donald Harris. U.S. Naval Medical Research Laboratory, Naval Submarine Base, New London, Conn. Apr 1954. 11p photos, diagr. Order from LC. Mi $2.40, ph $3.30. PB 130704

A delayed side-tone is defined as the sound of his own speech reaching a speaker's ear after a controlled delay interval. Analysis of recordings was undertaken only with those subjects whose speech was affected by the side-tone, i.e. showed stammering, stuttering, hesitation or blocking. Recordings of a stuttered phrase and the same phrase spoken normally by the subject was analyzed spectrographically. NMRI Proj NM 003 041.56.03. NAV MRL 248.

Effect of motion relationship and rate of pointer movement on tracking performance, by James F. Gardner. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright Patterson Air Force Base, Dayton, O. Sep 1957. 26p photos, diagrs, graphs, tables. Order from OTS. 75 cents. PB 131659

Forty-eight college students, using an aircraft-type control stick, attempted to keep cross-pointers centered on a simulated display in spite of random disturbances. Both the rate of pointer motion and the motion relationship between the control stick and the pointers were varied. Results indicate that: (a) tracking performance improves as the rate of pointer movement decreases; (b) the "fly-from" motion relationship is superior to the "fly-to" relationship; (c) the interaction of rates of pointer movement and direction of motion relationship is not significant; (d) practice and learning did not nullify the effects of an adverse motion relationship or of higher rates of pointer motion. AD 131002. Project 7189, Task 71571. AF WADC TR 57-533.

Effects of absolute and conditional probability distributions on instrument reading. Antioch College, Yellow Springs, O. Project 7186, Task 71545. Order separate parts described below as directed, giving PB number of each part ordered.

Part II: Comparison of a linear and a logarithmic scale, by Virginia L. Senders, Jerome Cohen, and Mary Arginteanu. Jul 1955. 38p diagr, graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 130406

The readability of a logarithmic scale was compared with that of a linear scale. Pointer settings were grouped into sequences of nine settings each. The settings increased either linearly or logarithmically. When grouped, settings from linear sequences formed a frequency distribution which was approximately rectangular; settings from the logarithmic sequences formed a positively skewed distribution. The same settings were also presented in a random order, and all settings, in both orders, were presented on both scales. The stimuli were presented tachistoscopically for exposures of .8 second and each of sixteen subjects were tested under every experimental condition. AD 95233. Project 7186, Task 71545. For Part I see PB 125145. Contract AF 18(600)-50. AF WADC TR 54-253, Part 2.

Part III: Comparison of a linear scale and two scales with expanded central portions, by Jerome Cohen and Virginia L. Senders. Mar 1958. 19p diagr, graphs, tables. Order from OTS. 50 cents. PB 131824

The experiments were performed to compare the readability of both a sigmoid scale and a scale with an expanded central portion with the readability of a linear scale. The average reading error for each of the conditions was determined both in scale unit and degrees of dial circumference. AD 118019. Contract AF 33(616)-3404, Part 3. AF WADC TR 57-65, Part 3.

Evaluation of the operational and psychological effects of a broadband blue illumination system in a CIC mockup, by R. Z. Hughes and Robert F. Chaillet. U.S. Naval Research Laboratory. May 1958. 25p ol. photos, diagrs, graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 132433

Based upon the premises that increased ambient light levels for CIC spaces are desirable and that the ability of personnel to detect and track radar targets as displayed on cathode-ray-tube repeaters must not be degraded by increased illumination levels, an investigation was made of the effects of a broadband blue (BBB) illumination system (a system of mutually exclusive filters covering the illumination sources and the crt displays) upon the performance of naval personnel conducting simulated operational problems in a CIC mockup. Color will not reproduce. NRL R 5132.

Hypothetical basis for quantitative scoring of the Navy Thematic Apperception Test (N-TAT), by Henry B. Murphree and Jean G. Carnaghan. U.S. Naval Medical Research Laboratory, Naval Submarine Base, New London, Conn. Jul 1955. 37p drawings, tables. Order from LC. Mi $3.00, ph $6.30. PB 130707

In an attempt to work out a simple, quantitative scoring method for the Navy Thematic Apperception Test, several hundred protocols were examined and an operational hypothesis was evolved. In brief, this theory would hold that if an individual is able to assess accurately and empathetically the group of which he is a member and his relationship with the group, he will be able to get along well with them. Putting this theory into operation, a scoring technique was evolved based on frequency of occurrence of various themes; this rated the man's conformity with the general reactions of the majority of the group. NMRI Proj. NM 003 041.54.02. NAV MRL 267.

Multiple psychophysiologic measures during gradual onset acceleration, by Julia A. Pettitt, Sanford I. Cohen, Albert J. Silverman, and George Zuidema. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, O. Feb 1958. 24p graphs, tables. Order from OTS. 75 cents. PB 131772

Psychophysiological factors associated with the response of subjects to gradual onset acceleration have been investigated. The level of central nervous system arousal, as well as the vascular changes which occurred during G, appear to be related to blackout and performance decrement. The phenomenon of blackout is hypothesized as a complicated psychophysiologic phenomenon not dependent merely on the function of vascular reflex mechanisms. AD 130796. Project 7215, Task 71713. AF WADC TN 57-234.

The utility of quickening techniques in improving tracking performance with a binary display, by P. A. Rund, H. P. Birmingham, C. L. Tipton, and W. D. Garvey. U.S. Naval Research Laboratory. Sep 1957. 7p photos, diagr, graphs, table. Order from LC. Mi $1.80, ph $1.80. PB 128553

This study investigates the usefulness of a binary display (two lights) where provision is made for additional phase advance beyond that required with a continuous display to provide a fully quickened system. It was found that the additional amount of phase advance resulted in a very respectable tracking performance with the binary display. NRL R 5013.

Time judgements, acoustic noise, and judgment drift, by Harry J. Jerison and Jules Arginteanu. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force base, Dayton, O. Jan 1958. 35p diagrs, graphs, tables. Order from OTS. $1.00. PB 131767

Six male undergraduates made time judgments in the rate projection situation with five rates and four different noise conditions. It was found that noise programs involving different levels for the stimulus and response periods lengthened the time judgments relative to those involving the same noise level. Repetition of the task also lengthened judgments. The results are discussed in terms of effects of acoustic noise and of psychological stress on subjective time, and the shift due to repetition is related to a similar effect on time-order errors in psychophysical experiments. AD 130963. Project 7193, Task 71614. AF WADC TR 57-454.

Visual acuity as a function of intensity for different hues, by John H. Berbert. U.S. Naval Research Laboratory. May 1958. 23p diagrs, graphs, tables. Order from OTS. 75 cents. PB 131587

This work resulted from consideration of color displays for the presentation of sonar data. The study was to determine the influence of luminous intensity and hue on the resolution of fine detail, where the fine detail was two points of light matched in intensity and chromaticity on a dark background. One of these light points could approach or recede from the other. When apparently just-touching, the dots actually were physically separated by a measurable distance. The angular subtense at the subject's eyes of this distance was called the threshold angular subtense. Six colors were used, white and five others of high purity having dominant wavelengths near 450, 500, 550, 600, and 650 mμ. For each color, just-touch settings were made for a range of intensities. NRL R 5104.

RUBBER AND RUBBER PRODUCTS

Development of aging and weather resistant tires and mechanical rubber goods. Final technical report covering period 1 Aug 1953-31 Oct 1956, under Contract DA 20-089-ord-36686, by R. E. Thompson, Jr., F. J. Presock, and W. B. Dunlap, Jr. Lee Rubber and Tire Corporation, Conshohocken, Pa. Nov 1956. 93p photos, diagr. Order from LC. Mi $5.40, ph $15.30. PB 130473

The scope of the work under this contract covers five basic divisions of investigation: Compounding; coatings; polymers; weather and sunlight; service testing of end products. AD 133471.

Development of fluoro-silicone elastomers, by Paul Tarrant. Peninsular Chem Research, Inc., Gainesville, Fla. Aug 1955. 46p tables. Order from LC. Mi $3.30, ph $ 7.80. PB 132216

The preparation of a homopolymer from 3, 3, 3-trifluoropropylmethyldichlorosilane has been accomplished on a small scale. Experimental conditions have been studied for the reaction of trichlorosilane and methyldichlorosilane with olefins. For hydrocarbon olefins, the best yield of addition product was obtained at 250°C without a peroxide catalyst. The use of a platinum catalyst supported on charcoal allows the use of lower reaction temperatures and shorter reaction times in these additions. The additions of silanes to a number of fluoroölefins have been carried out. Vinylsilanes have been found to react with molecules such as CCl_3Br, CF_2Br_2, CF_3I, $CF_2BrCFClBr$ and $CF_2ClCFClI$ to give compounds containing atoms on an alkyl side chain. The properties of these compounds have been studied. AD 93332. Project 7340, Task 73404. Covers work from Apr 5, 1954-Apr 4, 1955 under Contract AF 33(600)-26593. For Part 2 see PB 121395. AF WADC TR 55-220, Part I.

Development of high temperature resistant rubber compounds. Firestone Tire & Rubber Co., Akron, O. Contract AF 33(616)-3108. Project 7340. Order separate parts described below from OTS, giving PB number of each part ordered.

Part 1, by Floyd M. Smith, Thomas F. Lavery, Robert A. Hayes, Leland J. Kitchen, and Sydney Smith. Dec 1956. 265p photos, diagrs, graphs, tables. $4.00. PB 131923

Commercially available elastomers were compounded for high temperature performance and tested for resistance to 8-hr heat-aging up to 550°F, with the object of selecting elastomers that might prove suitable at 350-550°F for use in tires and other aircraft component parts. It was necessary to modify an L-6 Scott Tester. A special permeameter was developed. New polymers of high thermal stability were synthesized by extending polyester chains with Epon resin, and also with 1. 2. 3. 4-butanetetracarboxylic acid dianhydride. A special polyurethane rubber was developed which was thermally stable up to 350-400°F. This is about 50°F higher than for conventional polyurethane-type rubbers. Covers work from 15 Jul 1955-14 Jul 1956. AF WADC TR 56-331, Part 1.

Part II, by Robert A. Hayes, Floyd M. Smith, Ward A. Smith, and Leland J. Kitchen. Feb 1958. 189p photos, diagr, graphs, tables. $3.00. PB 131924

Elastomers of potential interest for high-temperature aircraft tires were studied. Most promising wire adhesions were obtained with silicone rubber. Experimental butadiene and acrylic polymers containing functional groups were prepared and their high-temperature properties were determined. Best properties at 400°F resulted from using a metal oxide -- particularly magnesium oxide or cadmium oxide -- with epoxy resin to cure the carboxy polymers, enabling 400°-F tensile strengths as high as 1400 psi to be obtained. It was found that butadiene copolymers can be vulcanized by heat alone at 500°F, a GR-S -carbon black mix giving a tensile of 2450 psi. Covers work from 15 Jul 1956-30 Nov 1957. AF WADC TR 56-331, Part 2.

Evaluation of high temperature hydraulic seals to temperature of 550°F. Part I: Mechanical evaluation, by Charles W. Galloway. Douglas Aircraft Company, Inc. Santa Monica Division, Santa Monica, Calif. Feb 1958. 155p photos, drawings, diagrs, graphs, tables. Order from OTS. $3.00. PB 131762

The program reported herein was conducted for the purpose of investigating, evaluating and developing seals and packings for use in high temperature hydraulic systems utilizing either OS-45 or MLO-8200 fluids at operating temperatures of 400°F and 550°F respectively. The scope of this program included seals of various shapes and forms as well as their method of installation and materials from which they were manufactured. In general, the results of this program showed that two polymers performed with considerable promise of 400°F. At 550°F no seals were found to be acceptable although one polymer, Viton A, exhibited good thermal resistance at that temperature. AD 142079. Project 1371, Task 13495, Covers work from Aug 1955 - May 1957 under Contract AF 33(616)-3026. AF WADC TR 57-76, Part 1.

Ozone resistant tires, by Walter O. Perrott. U.S. Arsenal, Detroit. Laboratories Division. Materials Laboratory, Center Line, Mich. Jan 1957. 14p photos, tables. Order from LC. Mi $2.40, ph $3.30. PB 132796

1. Tires, Pneumatic - Tests 2. DA R 3814

Test of mastic, self-curing, gasoline resistant rubber sealant for metal fuel cells. 3rd report on project TTI-649H for the period 7 Jul 1953-5 Jun 1956, by L. G. Bach. U.S. Aberdeen Proving Ground. Development and Proof Services. Automotive Division, Aberdeen, Md. Oct 1956. 14p photos. Order from LC. Mi $2.40, ph $3.30. PB 127386

The reinforced mastic was applied to fuel cells which had defects including seam cracks, defective welds, and holes caused by corrosion. One fuel cell was installed in a Tank, 90mm Gun, M47 and operated for 2781 miles; another cell was installed in a Tank, 90mm Gun, M48 and operated 1545 miles. All repairs were satisfactory at the conclusion of the endurance tests, although the M48 fuel cell failed by elongation of a seam crack. Dept. of the Army project no. 572-01-002. APG 412.5/470. APG Proj TTIH, Report no. 3.

STRUCTURAL ENGINEERING

Application of the bend test to the determination of the stress-strain curve, by Joseph I. Bluhm. U.S. Arsenal, Watertown, Mass. Aug 1950. 31p diagrs, graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 127371

Specialized expression for the stresses and strains in a beam under pure bending in terms of the applied load and angular deflection, as derived by Nadai, are modified to facilitate their practical application and to show their applicability to beams not under pure bending. These expressions permit the calculation of the stress-strain-curve from bend test data, and are particularly adaptable to materials which fail with relatively small deformations. Detailed procedures are worked out and presented in tabular form and illustrations are shown including a case where the stress-strain characteristics of the specimen in tension and compression differ. O.O. project TR 3-3027A. WAL project no.: 9-21-L. WAL R 110/19.

Finite deflections of thin elastic plates, by Edward L. Reiss. New York University. College of Engineering, Research Division, New York, N.Y. Contract Nonr-285(16). Order separate parts described below from LC, giving PB number of each part ordered.

Section 1. May 1955. 157p diagrs. Mi $7.50, ph $24.30. PB 127227

This report essentially consists of extensions, additions, and corrections of Synge and Chien's intrinsic theory of plates and shells. As opposed to Chien it is assumed that it is possible for differentiation with respect to the middle surface coordinated to lower the order of magnitude of the components of the middle surface strain and curvature tensors. By employing a different but equivalent classification scheme as compared to Chien, new large deflection equations are obtained.

Section 2. May 1955. 163p graph, tables. Mi $7.80, ph $25.80. PB 127083

1. Plastic deformation - Theory 2. Plates - Stress analysis 3. Plates - Plastic deformation

On the effect of boundary and loading conditions in the limit-analysis of plastic structures, by E.W. Ross, Jr. U.S. Arsenal, Watertown, Mass. Aug 1956. 10p diagrs. Order from LC. Mi $1.80, ph $1.80. PB 127456

The report contains brief discussions of the effect on the yield load of boundary and loading conditions and body shape, whenever the boundary conditions are of stress type. With the help of the limit-analysis notions for an elastic-plastic body it is found possible to prove in extremely simple fashion a number of results on the effect of altering boundary conditions or body shape. O.O. project TB 2-0001. D/A project 599-01-004. WAL R 880/53.

Shape at collapse of elastic-plastic plates simply supported along the edges, by A. R. Rzhanitsyn Brown University. Division of Applied Mathematics, Providence, R.I. Jan 1957. 49p diagrs, tables. Order from LC. Mi $3.30, ph $7.80. PB 132426

1. Plates - Bending 2. Plates - Plastic deformation 3. Contract Nonr-562(10), NR 064-406 4. BU AM TR 19

TEXTILES AND TEXTILE PRODUCTS

Development and evaluation of coated 3.5 ounce nylon twill, low count, by J. Naimer and R. Briganti. U.S. Bureau of Supplies and Accounts. Aug 1957. 14p tables. Order from OTS. 50 cents. PB 131535

A low count nylon twill fabric was developed and evaluated as a replacement for the 3-ounce nylon twill used in A-1 cold weather clothing. Test re-

sults on both the base and neoprene coated low count fabrics showed greatly improved tear strength indicating increased durability for the clothing. Field trials confirmed functionability and increased service life. Project no. NT 001-008: Cold and wet weather clothing. BUSANDA report control symbol 3950-2. NAVSANDA RDR 17.

Investigation of silicon compounds and dibromopropyl phosphates as flame retardants for cotton. Part I: Use of dibromopropyl phosphates as flame retardants for cotton. Part II: Investigation of silicon compounds as flame retardants for cotton fabrics, by J. David Reid and others. U.S. Army. Quartermaster Research and Engineering Command. Textile, Clothing and Footwear Division, Quartermaster Research and Engineering Center, Natick, Mass. Jul 1957 30p tables. Order from LC. Mi $3.00, ph $6.30. PB 132924

In Part I, the preparation and some of the properties of mono-, bis-, and tris-dibromopropyl esters of phosphoric acid are described. The ammonium salts of mono- and bis-(dibromopropyl) phosphoric acid apparently form polymers with trimethylolmelamine having definite phosphorus-to-bromine ratios which change after curing on cotton cloth. These polymers have been formed on cotton fabric by application of the monomers to confer excellent flame- and glow-resistance properties onthe cloth. In Part II, several silicon compounds, potentially capable of making durable finishes, were investigated as flame retardants for cotton. The compounds studied included polysiloxanes, acetoxysilanes, and silyloxy-phosphorus polymers. Project 7-12-01-002. QMC TSR 100.

TRANSPORTATION EQUIPMENT

Aeronautics

Aircraft

Handbook of instructions for experimentally determining the moments of inertia and product of inertia of aircraft by the spring oscillation method, by Claude R. Woodard. Cornell Aeronautical Laboratory, Buffalo, N.Y. Jun 1955. 301p photos, diagrs, graph, tables. Order from LC. Mi $11.10, ph $47.10. PB 132253

Moments and product of inertia of an aircraft are defined, the principles of the spring-oscillation method are discussed, the test equipment is described, an outline of the test procedure is given followed by a detail procedure giving explicit instructions for accomplishing each step, and sample data sheets outlining the calculation procedure are given. The results of a test program for the measurement of the internal characteristics of an F6F aircraft, using this test equipment, are included as an illustrative example. AD 97104. Proj 1365, Task 13550. Contract AF 33(616)-182. AF WADC TR 55-415.

Landing vertical velocity and accelaration measurements of Berlin Airlift C-54 aircraft, by J.J. Saunder and G.F. Piper. Glenn L. Martin Company, Baltimore, Md. Jul 1953. 55p photos, diagrs, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 132413

Photographic records of landings of the Berlin Airlift with C-54 aircraft have been analyzed. The results have consisted of sinking speeds, accelerations, horizontal speeds, and wing load factors at touchdown during landing. The analysis has been conducted for the purpose of obtaining accessory data that can be used in arriving at a design criterion for the selection of limit sinking speeds of land based aircraft. The probability of equalling or exceeding a given sinking speed or horizontal speed has been calculated and presented in curve form. The limitations of the results concerning the extension of the data to causes not included in the analysis have been indicated. The nature and scope of further sampling have been discussed. ATI 110685. This report supersedes AF TR 5787 dated Nov 1950. (Not in OTS). Declassified 11/22/57. Contract AF 33(616)-397. Contract AF 33(038)-9351. AF WADC TR 53-104.

Instruments

Directional glide path, by Thomas H. Bottoms, Henry C. Hurley, Lawrence N. Spinner, and John W. Watt. U.S. Civil Aeronautics Administration. Technical Development Center, Indianapolis, Ind. Feb 1958. 26p photos, diagrs, graphs, tables. Order from OTS. 75 cents. PB 131742

This report presents the theory of operation and test results of an instrument landing system glide path and associated monitor identified as the directional glide path. CAA TDR 336.

Investigation of carbon brushes for aircraft rotating electrical equipment, by J.E. Diehl. Stackpole Carbon Co., St. Marys, Pa. Oct 1956. 87p photos, diagr, graphs, tables. Order from LC. Mi $4.80, ph $13.80. PB 133203

Experimental materials were evaluated in an effort to obtain an improved type carbon brush to be applied to aircraft rotating electrical equipment such as generators, alternators, inverters, motors, etc. at all altitudes up to 60,000 feet. The evaluation was based on bell jar, slip ring, dynamometer friction and contact drop, seal level and altitude chamber equipment test results. Electrical, chemical, physical, densitometer, metalograph and mass spectrometer checks were employed in material analysis. AD 110517. Project 6058, Task 60272.

Covers work from 6 Mar 1951-30 Jun 1955 under Contract AF 33(038)-16442. AF TR 6124.

Shape coding of aircraft instrument zone markings, by Raymond Sabeh, Warren R. Jorve, and James M. Vanderplas. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, O. Mar 1958. 14p diagrs, tables. Order from OTS. 50 cents. PB 131798

Seventy college students and seventy rated Air Force officers were asked to indicate by a forced-choice matching technique their preferences for association of each of the shapes with each of seven stated aircraft functional categories. The results indicate the feasibility of using the seven selected shapes as instrument zone markings. AD 118343. Project 7186, Task 71549. AF WADC TN 57-260.

Study of the performance of aircraft air-cycle refrigeration units with internally controlled turbomachine components, by J. E. Coppage, P. A. Elkins, R. J. Jackson, and E. M. Knoernschild. AiResearch Manufacturing Company, Los Angeles, Calif. Apr 1958. 211p diagrs, graphs, tables. Order from OTS. $3.50. PB 131841

A study has been made of the performance characteristics of aircraft refrigeration units of the air-cycle type having internally controlled turbomachine components. General performance prediction methods were developed for the applicable components, including their variable features. The components studied were: (1) fans with adjustable prewhirl vanes, (2) centrifugal compressors with adjustable prewhirl vanes and with adjustable diffuser vanes, and (3) radial turbines with variable-area nozzle. The generalized performance of the units was studied for various stator settings, and curves are presented showing conditioned air flow, air temperature, and available cooling capacity for several operational conditions reflecting typical variations in air pressure and temperature at the inlet and discharge of the units. AD 151088. Project 5-(6-6146), Task 61190. Covers work from 29 Nov 1954-31 Jan 1957 under Contract AF 33(616)-2786. AF WADC TR 56-584.

Engines and Propellers

Theory of the annular nozzle in proximity to the ground, by Harvey R. Chaplin. U.S. David W. Taylor Model Basin. Aerodynamics Laboratory. Jul 1957. 43p. Order from LC. Mi $3.30, ph $7.80. PB 134260

A simple theory is presented for the effect of ground proximity on the force acting on a stationary body containing a downward-blowing annular nozzle around the periphery of its base. The results are found to be in agreement with experimental data. DWTMB AERO R 923.

Training and Training Devices

K-system MAC-1 trouble-shooting trainer: I. Development, design and use, by Robert Stanton French. U.S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Maintenance Laboratory, Lowry Air Force Base, Colo. Oct 1956. 34p photo, diagrs (1 fold). Order from LC. Mi $3.00, ph $6.30. PB 126890

AD 098893. Project 7709, Task 77152 and 37301. For Part II see PB 126758. 1. MAC-1 (Trainer) 2. Mechanics, Aeronautical - Training equipment 3. AF PTRC TN 56-119

Aerodynamics

Aerodynamic studies. Part 20. See entry under Bibliography on page 125. PB 131892

Design report, supersonic combustion tunnel, by Robert A. Gross. Fairchild Engine and Airplane Corp. Fairchild Engine Division, Deer Park, N.Y. Oct 1957. 49p photos, fold diagrs, graphs (part fold), table. Order from LC. Mi $3.30, ph $7.80. PB 132974

This report summarizes the major features incorporated in the design of a supersonic combustion research tunnel. This tunnel has been built in order to explore chemical energy release in supersonic flow. The report contains information on the aerodynamic design, heat transfer, structural design, operating analysis analysis and instrumentation. AD 136667. Project 37515. Contract AF 49 (638)-15. AF OSR TN 57-677.

Drag due to lift of a not-so-slender configuration, by Hsien K. Cheng. Cornell Aeronautical Laboratory, Inc., Aerodynamics Research Dept., Buffalo, N.Y. Sep 1957. 47p diagrs, graphs. Order from OTS. $1.25. PB 131702

By suitably restricting the body of the wing-body configuration, the not-so-slender wing theory introduced by Adams and Sears is extended to aid determining the desirable lift distribution for low drag. The problem of determination of minimum wave drag due to lift is re-examined. A desirable lift distribution is provided and its implication on configuration design is discussed. AD 118336. Projects 5-(1-1366) and 6-(8-1366), Tasks 70113 and 70102. Covers work from Mar 1955-Mar 1957 under Contract AF 33(616)-2933. AF WADC TR 57-316, Part I.

Experiments on circular arc and flat plate hydrofoils in noncavitating and full cavity flows, by Blaine R. Parkin. California Institute of Technology. Hydrodynamics Laboratory, Pasadena, Calif. Feb 1956. 50p photos, diagrs, graphs,

tables. Order from LC. Mi $3.30, ph $7.80. PB 132960

An investigation in the high speed water tunnel of the two-dimensional hydrodynamic characteristics of sharp-edged hydrofoils is described. The lift, drag, and pitching moment were measured in cavitating and noncavitating flows for flat plate and circular arc profiles. The theory of Wu for the forces on sharp-edged profiles in full cavity flow and the experimental results showed good agreement over a wide range of attack angles. AD 104598. Contract Nonr 220(12). CIT HL 47-6.

Investigation of a method for the measurement of subsonic oscillatory aerodynamic influence coefficients, by H. Norman Abramson and Paul A. Beckmann, Jr. Southwest Research Institute. Dept. of Engineering Mechanics, San Antonio, Tex. Dec 1957. 77p photos, diagrs, graphs, tables. Order from OTS. $2.00. PB 131819

Wind tunnel tests were conducted on a rigid two-dimensional wing model to determine the oscillatory pressures at various points on the planform resulting from a pulsating downwash source at a fixed point on the planform. The pulsating downwash was produced by a specially designed apparatus and pressures were recorded by means of differential pressure transducers and electronic recording equipment. Test results are compared with theoretical predictions, in so far as these are available. It is concluded that the experimental method developed during this program is a feasible one for the measurement of oscillatory aerodynamic influence coefficients. AD 142201. Project 7-(9-1366), Task 70171. Contract AF 33(616)-3838. AF WADC TR 57-736.

Mach number measurements in high-speed wind tunnels, by J. A. F. Hill, J. R. Baron, L. H. Schindel, and J. R. Markham. Advisory Group for Aeronautical Research and Development. Oct 1956. 121p diagrs, graphs, tables. Order from LC. Mi $6.30, ph $19.30. PB 127223

Measurements of subsonic and supersonic Mach numbers in air are discussed from the point of view of calibration measurements of an empty wind tunnel, of measurements of local Mach numbers at points in the flow field around a model, and of simulating free flight Mach number in the presence of wind tunnel wall interference. Errors in deducing Mach number from particular measurements are discussed and certain measuring procedures recommended. Agardograph 22.

Second-order boundary-layer theory of the viscous flow along a flat plate moving at high supersonic speeds, by Y. H. Kuo and Donald Earl Ordway. Cornell University. Graduate School of Aeronautical Engineering, Ithaca, N.Y. n.d. 23p graph. Order from LC. Mi $2.70, ph $4.80. PB 132451

1. Flow, Viscous - Coefficients 2. Boundary-layer - Flow 3. Flow, Supersonic - Incompressibility.

Solution of the potential equation for the unsteady flow about a triangular wing with subsonic leading edges in a supersonic main stream, by Yudell L. Luke, Geraldine V. Coombs, and Frank Wagner. Midwest Research Institute, Kansas City, Mo. Dec 1957. 38p diagrs, Order from OTS. $1.25. PB 131851

This report studies the solution of the equation of the velocity potential for a triangular wing in supersonic flow when the leading edges are subsonic as given perviously by Haskind and Falkovich. The report corrects numerous typographical errors and a few misstatements, and also sheds light on the pragmatic nature of the procedure for the purpose of composing numerical solutions. AD 118241. Project 7-(8-1370), Task 70411. Covers work from Oct 1956-May 1957 under Contract AF 33(616)-3058. AF WADC TR 57-258.

Theoretical analysis of the icing limit for an NACA 0004 airfoil, by Richard R. Perez and Thomas R. Shafer. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Directorate of Flight and All-Weather Testing. Wright-Patterson Air Force Base, Dayton, O. Apr 1957. 25p graphs (1 fold). Order from LC. Mi $2.70, ph $4.80. PB 132280

An investigation was made of the aerodynamic forces which cause frictional heating on the surface of an airfoil. Interest was fixed on that condition of frictional heating which maintains a surface temperature sufficient to prevent any ice formation. The effects of this thermodynamic process have been calculated and plotted for an NACA 0004 airfoil. AD 118263. AF WADC TN 57-106.

Two-dimensional supersonic wind tunnel investigations of flow in a duct with fluctuating exit pressure. Part I: Experimental technique, by Murray Kamrass. Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y. Jun 1957. 13p photos. Order from LC. Mi $2.40, ph $3.30. PB 132926

A wind tunnel investigation of diffusers with controlled periodically varying back pressures was initiated, in an attempt to determine the effects of frequency and amplitude of such pressure fluctuations upon the instantaneous shock pattern and the range of travel of the normal shock inside the diffuser. This report describes the experimental technique used thus far. Contract N6-ori-119. Project Squid. CAL DD-420-A-7. CAL TM-7.

Acoustical vibration from rocket motor combustion processes, by F.E. Boyd, R.G. Cumings and N.W. Guinard. U.S. Naval Research Laboratory. Jun 1957. 18p photos, diagrs, graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 132881

The character of incidental modulation which might be produced in guidance systems by sustained vibrations of the rocket motor and fluctuations of the rocket exhaust has interested designers of jets and guided missiles for many years. In order to evaluate the frequency spectra of the near-zone sound field on multiple firings of an engine, equipment was set up to record this field at various points for motor operation with a variety of fuels and fuel oxidizer ratios. The sound field was recorded and analyzed for frequency content over the range from 100 to 10,000 cps. NRL R 4934.

Effect of pressure and temperature on the rate of burning of double-base powders of different compositions, by William H. Avery and Roy E. Hunt. U.S. National Defense Research Committee. Oct 1943. 71f diagrs, graphs, tables. Order from LC. Mi $4.50, enl pr $13.80. PB 132888

It has been suggested that powders containing relatively large amounts of "coolants" such as DNT and TNT or ones containing potassium nitrate should have a lower variation of the rate of burning with temperature change at a given pressure than powders of the usual composition. With these hypotheses in view, 15 powders were chosen and tests made to determine the dependence of the rate of burning on temperature for each. Data are presented in tabular form and graphically. The fit of these data with various theoretical expressions for the burning rate are considered and an exponential form found best. Unclassified 9/2/54. NDRC A 225. NDRC 3-H. OSRD 1993. Contract OEMsr 273.

Erosive burning of double-base powders, by R.J. Thompson and F.T. McClure. U.S. National Defense Research Committee. Dec 1945. 81f photos, diagrs, graphs, tables. Order from LC. Mi $4.80, enl pr $15.30. PB 132887

This report describes a study of the erosive burning of several double-base powders. The experimental data are obtained by means of a controlled partial-burning technique and the analysis of the data is based on the one-dimensional theory of the gas flow in a rocket motor. The application of erosion data to internal ballistics and propellant charge design is discussed. The erosion studies at other laboratories in England and America are summarized briefly. Final report, Series P, no. 1.1. Unclassified 9/2/54. Contract OEMsr 273. NDRC 3-H. OSRD 5831.

Flame temperature and radiation studies in rockets, by R.S. Craig. U.S. National Defense Research Committee. Dec 1945. 63f photos, diagr, graphs, tables. Order from LC. Mi $3.90, enl pr $12.30. PB 132886

Radiation in rockets has been studied with a photoelectric pyrometer and with a small Bausch and Lomb quartz spectrograph. A description is given of the apparatus and experimental procedure. The flame temperatures of ten powders were measured with thephotoelectric pyrometer. Rather large fluctuations in temperature were observed during burning. Average temperatures from the more reliable experiments are in agreement with the calculated cooled isobaric temperatures. The mass emmissivities of three powders of the A77 series were studied in a rocket motor with a short light path. Emissivities are reported for the spectral ranges covered by the two photocell-filter combinations employed in the pyrometer. Final report, Series P, no. 2.1. Unclassified 9/2/54. Contract OEMsr 273. OSRD 5832. NDRC 3-H.

Generalized variational approach to the optimum thrust programming for the vertical flight of a rocket. Part II: Application of Green's theorem to the development of sufficiency proofs for particular classes of solutions, by Angelo Miele and Carlos R. Cavoti. Purdue University. Purdue Research Foundation. School of Aeronautical Engineering, Lafayette, Ind. Aug 1957. 26p diagrs, graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 132971

AD 136638. Research project no. 1303; Project Ae-27. 1. Rocket motors - Thrust 2. Ballistics, Rocket - Exterior 3. Green's theorem (Exterior ballistics) 4. Contract AF 18(603)-69 5. AF OSR TN 57-652 6. PUR A-57-2

Observations on the burning of double-base powders, by Bryce L. Crawford, Jr., Clayton Huggett, and John J. McBrady. U.S. National Defense Research Committee. Apr 1944. 76f photos, diagrs, graphs, tables. Order from LC. Mi $4.50, enl pr $13.80. PB 132885

Several aspects of the burning reaction of colloidal double-base propellants have been studied over a pressure range running continuously from 5 to 2000 lb/in^2. The character of the flame is discussed with particular attention to the transition from nonluminous to luminous burning at pressures near 300 lb/in^2. Improved visual methods of determining the burning rate have been developed that increase the observable range of pressures and improve the regularity of burning. Variants of the apparatus are described for both high- and low-pressure ranges. Determination was made of burning rates as a function of pressure and of temperature. The dependence of heat of explosion on

pressure was investigated. A semi-micro train method of analysis was used in determining the products of reaction at pressures from atmospheric to 1000 lb/in^2. The observed values are compared with those predicted thermodynamically and it is concluded that the reaction in the flame reaches equilibrium fairly well at pressures of 1000 lb/in^2 and higher. Variation of the initial temperature of the powder was found to have a slight but observable effect on the products of reaction. The data and conclusions of the present research are compared with the theories of Daniels, and of Boys and Corner. A tentative hypothesis is offered for the physical burning mechanism. Unclassified 9/2/54. Contract OEMsr 716. NDRC A 268. NDRC 3-H. OSRD 3544.

Rocket refractories, by Harry B. Porter. U.S. Naval Ordnance Test Station, China Lake, Calif. Aug 1955. 53p tables. Order from OTS. $1.50. PB 131503

Required characteristics of acceptable rocket refractories are set forth. Currently available basic refractory substances (including metal oxides, metal-metalloid compounds, and intermetallic compounds) are discussed, both individually and as ingredients of bonded-ceramic and cermet compositions. Present practices in the use of refractories as protective coatings, combustion chamber liners, and nozzles are given, with special emphasis on commercially avialable materials. Design and fabrication are discussed. Summary tables of physical and chemical properties are given, and a list of manufacturers and index of products are included in the appendixes. Areas that seem to have been neglected or insufficiently explored are pointed out, and some new approaches are suggested. NOTS 1191. NAVORD 4893.

Rocket research report no. XVII: Propellant level sensors for Viking, by Allen W Niles and Roger L. Easton. U.S. Naval Research Laboratory. Dec 1954. 32p photos, diagrs, graphs (part fold), tables. Order from LC. Mi $2.70, ph $4.80. PB 129026

With the design of a control to minimize the amount of unused propellant as the final objective, two types of murcury-manometer sensors have been developed; they were tested in Vikings 10 and 11. The use of the step sensor in a mixture-ratio control system has been simulated on an analog computer. This showed that rocket performance could be greatly improved by the use of such a control system. NRL R 4454.

Studies of the mechanism of burning of double-base rocket propellants. Final report, by Farrington Daniels and Associates, University of Wisconsin. U.S. National Defense Research Committee. n.d. 111f photos, diagrs, graphs, tables. Order from LC. Mi $6.00, enl pr $19.80. PB 132884

This report describes laboratory methods for measuring burning rates, chiefly with the aid of electrical-timing devices. In this method linear regression was measured directly with the help of electrical fuses and automatic electric timers. The effect of various surrounding gases on powder burning for double-base powders and powders containing manganese dioxide, the effect of added ingredients such as carbon black and potassium sulfate in varying amounts, and the effect of radiation absorption on the burning rate are also described. Submitted for publication, Jan 1945. Unclassified 9/2/54. Contract OEMsr 762, Final report. NDRC A 485. NDRC Div 3. OSRD 6559.

Study of the mechanics of liquid films as applied to cooling. Progress report no. 1-79 under Contract W-535-ac-20260, by Eldon L. Knuth. California. Institute of Technology. Jet Propulsion Laboratory, Pasadena, Calif. Nov 1951. 17p diagrs, graph, table. Order from LC. Mi $2.40, ph $3.30. PB 132843

1. Films, Liquid - Attachment 2. Rocket motors - Cooling 3. Contract W 535-ac-20260 4. CIT JPL 1-79

Supersonic mixing of jets and turbulent boundary layers, by Harry E. Bailey and Arnold M. Kuethe. Michigan. University. Engineering Research Institute. Dept. of Aeronautical Engineering, Ann Arbor, Mich. Jun 1957. 52p photos drawing, diagr, graphs, table. Order from OTS. $1.50. PB 131717

A theory is presented which permits the solution of a linearized form of the momentum equation for the case of two flows at different Mach numbers which merge as at the trailing edge of a two-dimensional airfoil. For the case of Prandtl number equal to one, it is shown that the energy equation reduces to the same form as the momentum equation. The theoretical solutions which are obtained for the velocity distribution in the mixing region are compared with experimental measurements made in a special supersonic channel. AD 150992. Project 1366, Task 70113. Contract AF 33(616)-2403. AF WADC TR 57-402.

Examination and test of failed port tail shaft-USS Norfolk (DL 1), by W.C. Stewart and H.C. Ellinghausen. U.S. Naval Engineering Experiment Station, Annapolis, Md. Dec 1955. 33p photos, diagrs, graphs, tables. Order from LC. Mi $3.00, ph $6.30. PB 130908

NSM-000-003. 1. Shafts, Propeller - Ships - Failure 2. Shafts, Propeller - Ships - Tests 3. NAV EES R 040007AZ(2)

Notes on the influence of unfair plating on ship failures by brittle fracture. Final report under Contract NObs-50148, by H.H. Bleich. National Research Council. Committee on Ship Construction. Mar 1956. 49p diagrs, graphs, table. Order from LC. Mi $3.30, ph $7.80. PB 132870

The primary purpose of this study was to determine whether or not unfairness in deck or hull plates in transversely framed dry cargo ships may be a substantial contributory cause to the loss of such vessels due to brittle fracture. It was finally concluded that plating unfairness per se has no significant bearing on the problem of brittle fracture. Project SR-132. Contract NObs-50148, Final report. NRC SSC-96.

Rotary-electrical ship's logs (screw-electric) and the Bol electric log, by Z. Krzymowski and D Rosenbaum. Translated by Halina Heitzman. Edited by Margaret W. Raven. Oct 1956. 66p photos, drawings, diagrs, graphs. Order from LC. Mi $3.90, ph $10.80. PB 126556

Describes the Chernikeev, Forbes, Sperry, and Bol logs, and discusses the advantages of each. Translated from Ship logs (Logi okretowe) p. 64-106 and 153-154, published in Warsaw, 1955. NAVSHIPS T 615. STS 242.

Short range propagation of sound in shallow water, by Marvin S. Weinstein. U.S. Naval Ordnance Laboratory, White Oak, Md. Sep 1956. 80p photos, diagrs, graphs. Order from LC. Mi $4.50, ph $12.30. PB 132448

The propagation of sound in shallow water has been studied both theoretically and experimentally. The detailed design of a test facility for the purpose of obtaining laboratory data under controlled conditions is described. The results indicate that the shear waves excited in the bottom must be included in the theoretical computations. The ray theory then yields results in excellent agreement with experimental data except in the vicinity of the range for which the incident angle for the first bottom reflection is equal to the critical angle for longitudinal waves in the plane wave reflection coefficient. NAVORD 4373.

WATER SUPPLY, SANITATION AND PUBLIC HEALTH

Report of sediments lining investigations. Fiscal year, 1956, by R.D. Dirmeyer, Jr. Colorado Agricultural and Mechanical College. Dept. of Civil Engineering, Fort Collins, Colo. Aug 1956. 38p photos, map, table. Order from LC. Mi $3.00, ph $6.30. PB 126593

Research and development work on the bentonite sedimenting technique of canal sealing has been actively carried on since July 1953. This report provides an over-all picture of the sedimenting method and the research and development work to date. CER no. 56RDD17. For earlier report see PB 118766 (CER 55RDD7). Contract DA 14-(06)-700-eng-1157.

MISCELLANEOUS

Application of the uniterm system and the association of ideas to a special library file, by Mortimer Taube. Documentation, Inc., Washington, D.C. Aug 1955. 9p. Order from LC. Mi $1.80, ph $1.80. PB 126943

1. Indexes - Theory 2. Files and filing 3. Contract Nonr-1305(00), Technical report no. 10

Report of NRL progress. U.S. Naval Research Laboratory. Aug 1958. 55p. Order from OTS. $1.25. Also avialable at annual subscription rate of $10.00 a year in U.S.A., foreign rate of $13.00 a year. PB 151030

Contents: Articles: Highly directive antennas used in NRL's radio astronomy program, Part II: The eighty-four foot radio telescope, by E.F. McClain. - Basic hydrogen-producing processes in electrolytic cells, Part II: Transport of hydrogen through palladium, by S. Schuldiner. - Scientific program : Problem notes: Applications research:

Effects of magnification and average course velocity on compensatory tracking. - Astronomy and astrophysics: Preliminary results of photoelectric photometry of faint stars.... Successful test firing of new upper-atmosphere research rocket (Aerobee-Jr NRL-51). - Chemistry: Investigation of the corrosive constituent in aircraft engine lubricants .... Algae and submarine habitability-an appraisal .... Underwater corrosion of ten structural steels exposed to tropical environments.... Hydrocarbon flame-extinguishing efficiencies of sodium and potassium bicarbonate powders.... Semimobile, controlled-relative-humidity air supply. - Mathematics: On the piezoelectric relations and the radical deformation of a polarized spherical shell of ceramic barium titanate. - Mechanics: Load-deflection data for irradiated and nonirradiated low-carbon-steel beam specimens.... Thermoelectric power of indium substitutional alloys as a function of wt-% tin additions.... Theory of games applied to a problem in vulnerability mechanics. - Metallurgy and ceramics: Crack sensitivity of high-strength sheet steels.... Effect of surface structure on the high-temperature creep behavior of nickel in air and in vacuum.... Creep of a dispersion-hardened aluminum alloy.... Creep of alloys of lead and of indium.... Corrosion mechanisms: Bubble pitting studies.... Effect of Calgon on the properties of ceramic barium titanate. - Radio: Radio wave propagation measurements.... Frequency indicator for the range 10 cps to 90 cps.... Flame radiance.... Microwave tube ("rising sun" magnetron) research .... Single-line-scan television for spinning rockets.... Broadband ferrite rotators using quadruply ridged circular waveguides.... Volumetric scanning GCA antenna prototype. - Sound: Intensity discrimination for narrow bandwidths of noise at various pulse lengths. - Supporting techniques: The design of a gas-tube type of voltage regulator circuit. - Published reports. - Papers by NRL staff members. - Patents.

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Administrative

Availability listing of USAEC reports. United States Atomic Energy Commission, Oak Ridge, Tenn. Jun 1958. 462p. Order from OTS. $3.00. TID-4000 (3rd Edition)

Biology and Medicine

Semiannual report to The Atomic Energy Commission, by Leon O. Jacobson and Antreen Pfau. Argonne Cancer Research Hospital, Chicago, Ill. Mar 1958. Contract AT-(11-1)-69. 68p. Order from OTS. $1.75. ACRH-9

Proceedings of the conference on radioiodine, by Dwight E. Clark. Argonne Cancer Research Hospital, Chicago, Ill. Nov 1956. Contract AT-(11-1)-69. 217p. Order from OTS. $3.00. ACRH-100

A study of the tissue response to sterile deposits of particulate material, by Thomas L. Chiffelle, Faith Sherping, Vernon C. Goldizen, and Clayton S. White. Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex. Oct 1957. Contract AT(29-1)-1242. 100p. Order from OTS. $2.75. AECU-3574

Retention and excretion of radionuclides of the alkali metals by five mammalian species, by Chester R. Richmond. Los Alamos Scientific Laboratory, Los Alamos, N. Mex. Jun 1958. Contract W-7405-ENG. 36. 139p. Order from OTS. $2.75. LA-2207

Gonadal dose in roentgen examinations. A literature search, by Henson Blatz and Wayne M. Lowder. New York Operations Office. Health and Safety Laboratory. Sep 1956. 6p. Order from LC. Mi $1.80, ph $1.80. NYO-2092

Studies on skeletal development in Japanese children. Roentgenographic indicators of maturity in bones of the foot, ankle, knee and elbow areas, by Yasushi Takahashi. Atomic Bomb Casualty Commission, Hiroshima, Japan. Dec 1956. 65p. Order from OTS. $1.75. NYO-4481

Radioactive isotopes in the United States hospitals, A survey of hospital administrators' problems up to 1957, by Marshall Brucer, J.H. Harmon, and William D. Gude. Oak Ridge Institute of Nuclear Studies, Inc., Oak Ridge, Tenn. Mar 1957. Contract AT-40-1-Gen-33. 48p. Order from OTS. $1.50. ORINS-21

Investigation of certain tissue protein changes in irradiated animals. Progress report for April 1, 1956 - March 31, 1957, by Henry G. Kupfer and Nelson F. Young. Medical College of Virginia, Richmond, Va. 1957. Contract AT(40-1)-1625.13 Order from LC. Mi $2.40, ph $3.30. ORO-168

Chemistry—General

A hollow cathode discharge tube for isotopic analysis Progress report, by G.W. Boyes and G.V. Wheeler. Phillips Petroleum Company. Chemical Processing Plant, Atomic Energy Division, Idaho Falls, Idaho. May 1958. Contract AT(10-1)-205. 10p. Order from OTS. 50 cents. IDO-14432

The solubility of zirconium tetrafluoride in nitric acid from 0 to 80°C, by A.G. Chapman and C.M. Slansky. Phillips Petroleum Company. Atomic Energy Division, Idaho Falls, Idaho. Apr 1958. Contract AT(10-1)-205. 14p. Order from OTS. 75 cents. IDO-14463

Annotated bibliography of alpha, beta, gamma, delta-tetraphenylporphine, by Charles V. Banks and Samuel Anderson. Ames Laboratory. Iowa State College, Iowa. Oct 1957. Contract W-7405-eng-82. 17p. Order from OTS. 50 cents. ISC-921

A polyethylene box-type mixer-settler extractor, by Lester Knapp, Roman Schoenherr, John Barghusen, and Morton Smutz. Ames Laboratory. Iowa State College, Iowa. Jan 1958. Contract W-7405-eng-82. 26p. Order from OTS. 75 cents. ISC-998

Measurement of impurity effects in the mass spectrometer isotopic analysis of uranium hexafluoride, by J. C. Horton. Union Carbide Nuclear Company. Division of Union Carbide Corp., Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tenn. Jun 1958. Contract W-7405-eng-26. 10p. Order from OTS. 50 cents. K-1365

Measurement of the isotopic enrichment of uranium by a direct comparison mass spectrometer method, by V. L. Warren and L. A. Smith. Union Carbide Nuclear Company. Division of Union Carbide Corp., Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tenn. Jun 1958. Contract W-7405-eng-26. 18p. Order from OTS. 75 cents. K-1369

Determination of iron in uranium by the carrier-distillation method using cobalt as an internal standard, by John B. Ramsay. Los Alamos Scientific Laboratory of The University of California, Los Alamos, N. Mex. Jun 1958. Contract W-7405-ENG. 36. 29p. Order from OTS. $1.00. LA-2171

Thorium - A literature search, by Earl W. Mautz. National Lead Company of Ohio, Technical Div., Cincinnati, O. Mar 1958. Contract AT(30-1)-1156. 17p. Order from OTS. 75 cents. NLCO-727

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A study of the effect of methyl fluoride recycle on the decomposition rate of polymer during fractionation, by J. L. Hanner. Hooker Electrochemical Co., Niagara Falls, N. Y. Jun 1954. Decl. Mar 1957. Contract AT(30-1)-1524. 11p. Order from LC. Mi $2.40, ph $3.30. NYO-1240

Electrolytic boron process, by George T. Miller. Hooker Electrochemical Co., Niagara Falls, N. Y. May 1956. Decl. Apr 12, 1957. Contract AT(30-1)-1524. 30p. Order from LC. Mi $3.60, ph $9.30. NYO-1265

Electron microscope and optical studies of the reaction of carbon with oxygen, by Thomas J. Strezewski and John Turkevich. Princeton University, N. J. Aug 1957. Contract AT(30-1)-1301. 21p. Order from LC. Mi $2.70, ph $4.80. NYO-3436

Kinetics of reactions between liquid metals and liquid salts. Progress report covering period March 1, 1957 to November 1, 1957, by Thomas B. King. Massachusetts Institute of Technology, Dept. of Metallurgy, Cambridge, Mass. 1957. Contract AT(30-1)-1985. 14p. Order from LC. Mi $2.40, ph $3.30. NYO-4804

Graphite liner program. Report no. 2. Mallinckrodt Chemical Works, St. Louis, Mo. Jun 1944. Decl. with deletions Feb 26, 1957. 4p. Order from LC. Mi $1.80, ph $1.80. NYO-5054 (Del.)

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Summary of experiments on phosphate removal (from ore refinery feeds), by John W. Barnes. Mallinckrodt Chemical Works, St. Louis, Mo. Dec 1944. Decl. Mar 28, 1957. Contract W-7405-eng-1. 5p. Order from LC. Mi $1.80, ph $1.80. NYO-5071

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The deterioration of UO_2 in storage, by G. L. Martin. Mallinckrodt Chemical Works, St. Louis, Mo. May 1948. Decl. Mar 7, 1957. 5p. Order from LC. Mi $1.80, ph $1.80. NYO-5228

An investigation of the chemical nature of the organic matter of uraniferous shales. Annual report covering the period January 1 to December 31, 1956, by C. R. Kinney, R. L. Broadhead, J. T. Leonard, T. J. Roessing, and F. J. Vastola. Pennsylvania State University. College of Mineral Industries. Dept. of Fuel Technology. University Park, Pa. Sep 1956. Contract AT(30-1)-1442. 36p. Order from LC. Mi $3.00, ph $6.30. NYO-6675

Factors affecting the mechanism of graphitization and the heterogeneous gas reactions of graphites. Quarterly progress report for January 1, 1955 to March 31, 1955. Part I. Carbonization and graphitization, by D. B. Murphy and W. V. Kotlensky. Part II. Heterogeneous gas reactions of carbons. C. Gasification rate studies on carbons at low temperatures, by A. F. Armington. Pennsylvania. University. Mineral Industries Experiment Station, University Park, Pa. May 1955. Contract AT(30-1)-1710. 22p. Order from LC. Mi $2.40, ph $3.30. NYO-6682

Solid solutions and grain boundaries. Progress report no. 21, by B. L. Averbach, M. Cohen, F. Herbstein, J. Hilliard, and P. S. Rudman. Massachusetts Institute of Technology. Dept. of Metallurgy, Cambridge, Mass. Mar 1954. Contract AT(30-1)-1002, Scope 2. 4p. Order from LC. Mi $1.80, ph $1.80. NYO-7040

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The reaction of aluminum hydride with 3d transition metal halides. Progress report for March 17, 1955 to November 1, 1955, by M. John Rice, Jr., T. R. P. Gibb, Jr., and Edward G. Meloni. Tufts University, Medford, Mass. Nov 1955. Decl. Jan 13, 1956. Contract AT(30-1)-1355. 19p. Order from LC. Mi $2.40, ph $3.30. NYO-7542

Diazo derivatives of β-diketones, by W. Conard Fernelius, Lillian D. Berg, and Guilia Irving. Pennsylvania State University. College of Chemistry and Physics, University Park, Pa. Jul 1956. Contract AT(30-1)-907. 11p. Order from LC. Mi $2.40, ph $3.30. NYO-7715

Solid-liquid equilibrium in the lithium-lithium hydride system. III. Period covered: June 1, 1956 to June 1, 1957, by Charles E. Messer, Regina A. Seales, and John Mellor. Tufts University. Medford, Mass. Jul 1957. Contract AT(30-1)-1410. 12p. Order from LC. Mi $2.40, ph $3.30. NYO-8021

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Purex process laboratory development progress report for period August 1952 through January 1953, by J. R. Flanary, H. J. Groh, Jr., L. E. Line, Jr., and V. J. Reilly. Oak Ridge National Laboratory, Oak Ridge, Tenn. Jul 1953. Decl. Mar 5, 1957. Contract W-7405-eng-26. 50p. Order from LC. Mi $3.30, ph $7.80. ORNL-1549

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Compatibility of pump lubricants with alkali metals and molten fluoride salts, by G. Goldberg, A.S. Meyer, Jr., and J.C. White. Oak Ridge National Laboratory, Oak Ridge, Tenn. Jan 1957. Decl. Sep 18, 1957. Contract W-7405-eng-26. 16p. Order from LC. Mi $2.40, ph $3.30. ORNL-2168

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Report on vapor-liquid equilibria of nitric acid solutions containing chloride ion, by P.F. Hagerty and A.N. Hixon. Pennsylvania. University. Philadelphia, Pa. 1953? Decl. Jan 7, 1954. Sub-Contract AT(30-1)-1311. Contract AEC-3000-5131. 21p. Order from LC. Mi $2.70, ph $4.80. TID-5146

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Investigation of the breakdown products of para-aminobenzoic acid after radiation with x-rays, by Robert Robbins and Samuel Melvin. Temple University. School of Medicine. Radiobiology Laboratory, Philadelphia, Pa. Jan 1954. Contract AT(30-1)-1196. 95p. Order from LC. Mi $5.40, ph $15.30. NYO-4601

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Survey of processes for radium recovery from pitchblende ores, by A.B. Babcock, Jr. Atomic Energy Commission. New York Operations Office, New York, N.Y. 1950. Decl. with deletions Feb 28, 1957. 59p. Order from LC. Mi $3.60, ph $9.30. NYO-112(Del.)

Sulfuric acid extractive distillation process for the recovery of anhydrous hydrofluoric acid from by-product aqueous hydrofluoric acid. Preliminary process design and economic study, by R.W. Legassie and J.P. Termini. Atomic Energy Commission. New Brunswick Laboratory, New Brunswick, N.J. Feb 1954. Decl. with deletions Feb 27, 1957. 29p. Order from LC. Mi $2.70, ph $4.80. NYO-2048(Del.)

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Investigations to determine the feasibility of ultrasonic liquid-liquid extraction, by J. L. Straughn and W. B. Tarpley. Aeroprojects, Inc., West Chester, Pa. Feb 1957. Contract AT(30-1)-1798. 66p. Order from LC. Mi $3.90, ph $10.80. NYO-7936

Solvent extraction recovery of uranium from metal waste, by C. V. Ellison, D. E. Ferguson, and T. C. Runion. Oak Ridge National Laboratory, Oak Ridge, Tenn. Jun 1949. Decl. Mar 19, 1957. Contract W-7405-eng-26. 5p. Order from LC. Mi $1.80, ph $1.80. ORNL-258

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A new anionic solvent extraction technique, by F. L. Moore. Oak Ridge National Laboratory, Oak Ridge, Tenn. Jul 1952. Decl. Mar 2, 1957. Contract W-7405-eng-26. 9p. Order from LC. Mi $1.80, ph $1.80. ORNL-1314

Laboratory development of the thorex process. Progress report for July 1, 1954 to November 30, 1955, by R. P. Wischow and R. G. Mansfield. Oak Ridge National Laboratory, Oak Ridge, Tenn. Jun 1956. Decl. with deletions Mar 1, 1957. Contract W-7405-eng-26. 60p. Order from LC. Mi $3.60, ph $9.30. ORNL-1994(Del.)

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A summary of the separation operations, by M. E. Whatley. Union Carbide Corp. Oak Ridge National Laboratory, Education Division, Oak Ridge, Tenn. n.d. Contract W-7405-eng-26. 102p. Order from OTS. $2.75. ORNL-2477

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